MONTHLY WEATHER REVIEW,

SEPTEMBER, 1879.

(General Weather Service of the United States.)

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

In preparing this REVIEW the following data, received up to October 14th, have been used, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 131 Signal Service stations and 12 Canadian stations, as telegraphed to this office; monthly journals and means 147 and 152 respectively, from the former; reports from 29 Sunset stations; 240 monthly registers from Voluntary Observers; 28 monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; monthly reports from Voluntary Observers in, and the local Weather Service of, Missouri; reliable newspaper extracts; special reports.

BAROMETRIC PRESSURE.

Upon chart No. II is shown by the isobaric lines the general distribution of atmospheric pressure, as reduced to the sea level, for the month. East of the Rocky Mountains the pressure during the month has been above the average for the past seven years, at all stations except Key West, Punta Rassa, New Orleans, Vicksburg, and Pembina, at which stations the difference is zero. The excess has in general ranged from 0.02 at the other stations on the Gulf coast, 0.05 along the Atlantic coast, in the Lake region and Northwest to 0.08 in the Ohio valley. On the Pacific coast the difference is very small.

The *Local Barometric Ranges* have been greatest over the Northwest and Lake Region and over a narrow belt from New Orleans to Ohio in the track of storm area No. I; and least along the South Atlantic coast and from Texas to California. Taken by districts they vary as follows: Atlantic States from 0.79 of an inch at Eastport to 0.26 at Key West; Gulf States, 0.42 at St. Marks and 0.45 at Indianola to 0.82 at New Orleans; Tennessee and Ohio Valley, 0.72 at Cairo to 0.96 at Cincinnati; Lake Region, 0.86 at Oswego and 0.71 at Milwaukee to 1.05 at Port Huron; the Northwest, 0.66 at St. Louis to 1.05 at Yankton; Rocky Mountains, 0.43 at Santa Fe to 0.59 at Denver; Pike's Peak, 0.37; Western Plateau, 0.31 at Tucson, Ariz. to 0.45 at Pioche and Winnemucca and 0.66 at Boise; California, 0.24 at San Diego to 0.29 at Red Bluff and 0.31 at Visalia; Oregon, 0.72 at Roseburg and 0.89 at Portland.

Areas of High Barometer.—Of these, five have been sufficiently marked to merit description.

No. I.—This area was present off the coast of Oregon and Washington Territory at the morning report of September 1st, the barometer at Portland being 0.14 inch above the normal. The area moved eastward, and on the morning of the 3rd, was central near Bismarck, the barometer at that station being 0.29 inch above the normal. North and northwest winds prevailed throughout the Northwest, the Upper Mississippi and Lower Missouri valleys, and over the Upper Lakes. The minimum temperature reported was 33° at Fort Stevenson, Dakota. Moving southward the area was central at North Platte, Nebraska, on the morning of the 4th, barometer 0.22 inch above the normal. On the morning of the 5th the area was central near Cairo, Illinois, barometer 0.12 inch above the normal; the temperature in the Lower Lake region, the southern portion of the Upper Lakes and in Upper Mississippi valley, was slightly below the normal, and generally clear weather prevailed throughout the United States, excepting in the extreme Northwest and in Maine. During the 6th and 7th the area moved eastward and disappeared off the South Atlantic coast. High winds were reported from stations on Lake Michigan on the 3rd.

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No. II—made its appearance in the Northwest on the 7th, the barometer at Bismarck, Dak., at the morning report being 0.25 in. above the normal. Frost was reported from Fort Stevenson and Deadwood, Dak. The morning report of the 8th showed the area central near Breckenridge, Minn., barometer 0.29 in. above the normal. Light frost was reported from Davenport, Iowa. At the afternoon report of the 9th the pressures at all stations east of the Mississippi river, excepting those in the New England States, were above the normal, the area being then central over Lake Michigan. The temperatures were below the normal in the Lake region, the upper Mississippi and Ohio valleys and Tennessee, and in the Middle and South Atlantic States. Cautionary Off-Shore Signals were ordered up at 12.45 a. m. of the 8th at Sandy Hook, Atlantic City, and Cape May. The signals were justified by velocities of 35 miles at Cape May, 30 miles at Atlantic City, and 32 miles at Sandy Hook. The winds, which had been southerly on the South Atlantic coast, veered to the north during the night of the 8th, and high winds, 48 miles at Cape Lookout, and 25 miles at Cape Henry, were reported at midnight of that date. Cautionary Signals were ordered at Cape Henry, Kittyhawk, Cape Hatteras, Macon, Cape Lookout, and Smithville, at midnight of the 8th. These signals were lowered at 6.30 p. m. of the 9th, having been fully justified. During the 9th, 10th, and 11th, the area moved eastward, and at midnight of the 11th was off the New England and Middle Atlantic coasts. On the morning of the 12th it had disappeared.

No. III—made its appearance on the Oregon coast on the 9th, the barometer having risen during the night of the 8th at all stations on the Pacific coast north of Sacramento, Cal. At the morning report of the 10th the barometer at Portland, Or., was 0.25 above the normal. The barometer continued rising rapidly in Oregon, and thence eastward to Dakota, the most rapid rise being at Virginia City, Mont., a rise of 0.21 in eight hours being reported from that station at the afternoon observation of the 10th. The area moved slowly to the southeast, and on the morning of the 13th was central near North Platte, Neb., where the barometer was 0.28 above the normal. At the morning report of the 14th the area was central near Cairo, Ill.; thence during the 14th, 15th and 16th it moved northeastward over the Ohio valley, the Middle Atlantic and New England States, and disappeared. Generally cool weather marked the passage of this area across the country. Frost was reported from Dodge City on the 11th, and Davenport, Iowa, on the 14th. The minimum temperatures for the month were induced by this area at Cheyenne, North Platte, Vicksburg, Miss., New Orleans, La., and Mobile, Ala.

No. IV—appeared in the Northwest on the 17th, the Bismarck barometer being 0.27 inch above the normal at the midnight report of that date. At the morning report of the 18th, the barometer was 0.34 inch above the normal at Bismarck and Breckenridge and was rapidly rising on the Upper Lakes and in the Upper Mississippi and Lower Missouri valleys. Moving southeastward it was central at Davenport, Iowa, on the morning of the 20th, thence moving northeastward, it was central on Lake Huron on the morning of the 21st, and at Chatham on the morning of the 22nd. The pressures remained high in New England and the Middle Atlantic States and the Maritime Provinces of Canada during the 22nd, and gradually fell on the approach of low area No. VII. The minimum temperatures reported during the passage of the area, were Breckenridge, Minn., 24° on the 18th; 36° at St. Paul and Dubuque and 34° at Des Moines on the 20th. These were the minimum temperatures for the month at these stations. Cautionary Signals were ordered up, in advance of this area, at Cape Hatteras, Lookout, Kittyhawk and Macon at the midnight report of the 19th, at Cape Henry, Wilmington and Smithville at 9:20 a. m. of the 20th, and from Norfolk to New Haven during latter part of 20th and morning of 21st. The signals at Smithville and Wilmington, were lowered at 11:50 p. m. on the 21st, those from Norfolk to New Haven on the afternoon and midnight of the 22nd, and at Macon, Lookout, Hatteras, Kittyhawk and Henry at 9 a. m. of the 23rd, having been fully justified. The maximum velocity of wind reported was 47 miles at Cape Henry. Cautionary Signals were ordered up at Indianola and Galveston at the afternoon observation of the 19th. The signals were not justified at these stations, but rough weather and high N. winds were experienced on the Gulf, and eleven vessels were lost on the 19th near Santa Anna, Mexico, during "a severe norther."

No. V—followed in rear of low area No. VII. At the morning report of the 23rd, the line of 0.30 in. above the normal pressure embraced within its limits Bismarck, Breckenridge and Pembina—the temperature at Pembina at this report, was 19° (26° below the normal), the minimum temperature reported from any station within the United States during the month. The temperatures reported from stations in the United States were, with a few exceptions, below the normal. The pressure continued increasing in the Northwest during the 23rd, the area remaining nearly stationary during that day. Moving first southeastward and then eastward, the area was central in Iowa on the morning of the 24th, at Indianapolis, Ind. on the morning of the 25th, and at Albany on the morning of the 26th. The pressures remained above the normal in the eastern portion of the United States during the remainder of the month, the area being central off the South Atlantic coast at the midnight report of the 30th. This area was accompained by very low temperatures, the minima temperatures for the month for the Upper Mississippi and the Ohio valleys, the Lake region, New England and the Middle and South Atlantic States. Frost was reported from Yankton on the morning of the 24th, from Toledo, Ohio, Indianapolis, Ind., Cairo, Ill., Cincinnati, Ohio and Pittsburgh, Pa., on the morning of the 25th, and from Burlington, Vt., Albany, N. Y., New Haven, Philadelphia, Washington, D. C., Lynchburg, Va. and Charlotte, N. C., on the morning of the 26th. Cautionary Off-shore Signals were ordered in advance of this area at capes Lookout and Hatteras at 6:42 p. m. of the 24th; these were changed to Cautionary Signals at midnight of the same date, and signals were ordered up at Cape Henry, Kittyhawk, Macon and Norfolk. The signals were lowered at 11:50 p. m. of the 26th, having been fully justified. The Off-shore signals ordered on the New England and New Jersey coasts, are considered in connection with low area No. VII.

Areas of Low Barometer.—Nine areas have been sufficiently marked to merit description, but the centers of only seven have followed tracks well enough defined to enable them to be properly located on the charts. The tracks of these seven are shown on Map No. I.

No. I.—This storm was a continuation of low area No. XI described in the August REVIEW. On the morning of the 1st the area was central over the Gulf of Mexico, southwest of New Orleans, at which station the barometer was 0.45 inch below the normal, and the wind was blowing with a velocity of 26 miles from the east. Cautionary Signals had been ordered up at Indianola, Galveston, New Orleans, Port Eads, and Mobile, on the morning of August 30th, and were still displayed and had been justified at all the stations excepting Mobile. East of the Rocky Mountains, excepting in the extreme Northwest, the barometer was below the normal. Cloudy weather and rain were reported from the southern portion of the South Atlantic States, the Eastern Gulf States, and from Tennessee. At the afternoon report of the 1st the storm was central northwest of New Orleans. The barometer had continued to fall rapidly in the lower Mississippi valley, being now 0.61 in. below the normal at New Orleans, 0.41 at Vicksburg, 0.29 at Shreveport, and 0.36 at Mobile. The barometer had risen slightly in the Lake region; elsewhere it had fallen. Cloudy weather and rain continued in the Mississippi valley, the Eastern Gulf and South Atlantic States and Tennessee, and were reported from the Ohio valley. Light rains were reported from Chicago, Toledo, and Milwaukee. High winds were reported from Indianola, Galveston, and New Orleans, the maximum velocity reported being 40 miles at the latter station. The temperature had fallen, since last preceding report, in the Lake region, and thence southward to the Gulf States. Elsewhere it had risen. Cautionary Signals were ordered up at Toledo and Sandusky. At the midnight report the area was central in southern Mississippi. The barometer remained nearly stationary, but had risen slightly at the Gulf stations. The wind at New Orleans had veered to W. and at the time of the report was blowing with a velocity of 26 miles. Maximum velocity since last report, 36 miles. The wind at Mobile remained southeast, and the signal at that station had been justified. The area of cloud and rain had extended itself northward, generally cloudy weather and numerous rains being reported from the Lake region. Heavy rain (1.69 in. in 8 hours) accompanying a thunder-storm was reported from Sandusky; heavy rain-falls were also reported from Indianapolis, Louisville, and Chattanooga. The temperatures remained nearly stationary. Cautionary Signals were lowered at Indianola and Galveston, and ordered up at Cleveland, Detroit, and Port Huron. On the morning of the 2nd the storm was still central in southern Mississippi, having moved slowly northward. The barometer had risen rapidly in the Gulf, a rise of 0.22 in. in 8 hours being reported from New Orleans. It had fallen in the Lake region, the South Atlantic States, Tennessee and the Ohio valley. The temperatures had risen slightly in the same districts and in the Eastern Gulf States and Lower Mississippi valley, the greatest rise, 9° in 8 hours, was reported from Louisville. The winds in the Lower Lake region and southern portion of the Upper Lake region had become NE. or E., and a velocity of 25 miles was reported from Toledo, Ohio. Cloudy weather and rain prevailed in the Lake region, Tennessee, the Ohio valley and the South Atlantic States. Heavy rain was reported from Indianapolis and Cincinnati. Cloudy weather was reported from the Middle Atlantic States, with light rain at Lynchburg, Va. West of the Mississippi river, clear weather prevailed, and a slight fall in temperature was reported. The afternoon report of the 2nd showed the storm central at Nashville, Tenn. Cloudy weather and rain prevailed from the Mississippi river north of Vicksburg to New England. The barometer had risen slightly in New England, the Northwest and in the Gulf States, elsewhere it had fallen, the greatest fall 0.14 in. in 8 hours, being reported from Nashville. In New England and west of the Mississippi the temperature had risen; elsewhere it had fallen. Cautionary Signals were ordered up on the Atlantic Coast from Savannah, Ga. to New York, and on the lakes at Buffalo, Chicago, Milwaukee and Section One, Erie, Grand Haven and Section Three. The storm continued moving north, and at midnight of the 2nd was central at Louisville; barometer 0.54 in. below the normal. The barometer had fallen in the Lake region, the Ohio valley, the Middle Atlantic States and northern portion of the South Atlantic States; elsewhere, it had remained stationary or risen slightly. The temperature remained nearly stationary. Heavy rain-falls, 1.70 in. from Indianapolis, 1.40 in. from Louisville, and 1.23 in. from Cincinnati, were reported. Cautionary Signals were ordered for Alpena. At the morning report of the 3rd, the storm was central in western Ohio, Cincinnati barometer 0.54 in. below the normal. The barometer had risen in the Northwest and Tennessee, and had fallen rapidly in the Lake region and the Middle Atlantic States; elsewhere, it had remained nearly stationary, with slight changes in temperature. Clear or partly cloudy weather prevailed, except in the Lake region, the Ohio valley and the Middle and South Atlantic States, in which districts cloudy and rainy weather continued. Cautionary Signals were ordered for Escanaba, Marquette, Duluth, Rochester, Oswego and Section Six. At the afternoon report of the 30th, the depression was central near Port Huron—barometer 0.60 in. below the normal. The barometer had fallen rapidly in advance of the center, the greatest fall 0.21 in. in 8 hours, being reported from Saugeen, and had risen rapidly in rear of the center, the greatest rise 0.32 in. in 8 hours, being reported from Cincinnati. The temperature had fallen in the Lake region, Tennessee and the Ohio valley, the South Atlantic States and New England; elsewhere, it had remained stationary or had risen slightly. Cautionary Signals were ordered down at Savannah and Charleston. High winds were reported from Duluth, Milwaukee, Grand Haven and Erie on the lakes, and Kittyhawk and Sandy Hook on the Atlantic coast. Heavy rain continued in the Lake region. The weather in the South and Middle Atlantic States was rapidly clearing. At midnight of the 3rd the storm was central on Lake Huron, Saugeen barometer 0.61 in. below the normal, with N. to W. winds in the Upper

Lake region and SE. to SW. on the Lower Lakes. East of the Mississippi river the pressures remained below the normal, excepting in Maine, but were slowly recovering south of the Lakes and west of the Middle Atlantic States. In the Middle Atlantic States and New England and in Canada, the barometer continued falling. High winds were reported from Sandusky, Cleveland and Alpena. Clear or partly cloudy weather prevailed, excepting in the Lake region, New England and northern portion of the Middle Atlantic States. Cautionary Signals were ordered down from Smithville to New York, having been justified at all stations north of Cape Hatteras. On the morning of the 4th, the storm was central midway between Parry Sound and Toronto, with NW. to W. winds in the Lake region. Winds exceeding 25 miles per hour in velocity, were reported from Alpena, Saugeen, Toledo, Sandusky, Cleveland, Erie, Buffalo and Kingston, and clearing weather, with rising barometer, was reported from the Lake region. North of Tennessee and east of the Mississippi river, the winds still remained under the influence of the storm. At the afternoon report the storm was central northwest of Montreal. High winds were reported from Alpena, Erie, Rochester and Kingston, as occuring during the preceeding eight hours, but at the time of report, the winds had fallen to brisk, and signals were ordered down at all stations on the lakes, excepting Port Huron. Pressures were rapidly recovering in rear of the storm, a rise of 0.30 inch being reported from Kingston. The storm continued moving northeastward, and at midnight of the 4th. was central north of Quebec. Cautionary Signals were ordered down at Port Huron. On the morning of the 5th, the centre was too far north of the Signal Service stations to accurately locate it. The pressures on the lakes rapidly recovered under the influence of the area of high barometer then central in the Ohio valley. This storm was very severe on lakes Huron and Erie, and many accidents to vessels were reported. The Steamer Bertschy was lost on lake Huron. The maximum velocity of wind during the storm was 43 miles at Sandusky at 9:45 p. m. on the 3rd. A number of casualties resulting from this storm have been reported from New Orleans. A fleet of coal boats was sunk above the city, loss estimated at $103,000. The steamboat Trenton was capsized and with her cargo proved a total loss, value $25.000. At Berwick and Morgan City the loss was estimated at about $50,000 and several men were washed overboard from vessels and drowned in Calcasieu Pass. At Manderville, on Lake Pontchartrain, the damage to small boats, houses, etc., was estimated at $5,000. The damage to the cotton crop, in districts visited by the storm, was estimated at about 10 per cent. of the value of the crop. Considerable damage was also caused to the sugar crop.

No. II—made its appearance in Manitoba on the 4th and pursuing a course a little south of east was central on the morning of the 5th NE. of Pembina, and on the morning of the 6th, on Lake Superior. At the afternoon report, it was central on the eastern shore of Lake Superior, thence pursuing a NE. course, it passed too far north to permit its path to be accurately charted. This area was accompanied by light rains on the Upper Lakes on the 5th and 6th, and on the Lower Lakes on the latter date. Cautionary Signals were ordered up at Duluth, Marquette, Escanaba, Milwaukee and Section One, Grand Haven and Section Three and Chicago on the afternoon of the 5th, and at Sandusky on the morning of the 6th, and were lowered at midnight of the 6th, having been justified at all stations excepting Duluth and Sandusky, by maximum velocities of W. 27 miles at Milwaukee, SW. 28 at Marquette and W. 30 at Grand Haven. The lowest barometer reported during the passage of this depression was 29.71 in., 0.28 in. below the normal, at Marquette on the morning of the 6th. No disasters were reported from any of the lake stations.

No. III—was central in Nebraska at the midnight report of the 6th, Omaha barometer 0.14 in. below the normal. Light rain had fallen since the afternoon report, at Yankton and St. Paul; elsewhere throughout the United States, clear or partly cloudy weather prevailed. The temperature was below the normal in the Upper Mississippi valley, the Upper Lake region and on Lake Erie. On the morning of the 7th, the barometer had fallen in the Upper Lake region, and had risen rapidly in the Lower Missouri valley. The temperature had remained nearly stationary. Cloudy weather and light local rains were reported from stations in the Upper Lake region. Heavy rain had fallen during the night at La Crosse, and light rain at St. Paul, but at the time of report, the rain had ceased, and clear or partly cloudy weather was reported; S. to W. winds prevailed in the Lake region. At the afternoon report, the depression was central near Detroit—Detroit and Port Huron barometers 0.16 in. below the normal. The barometer had fallen in the Lower Lake region and in Ohio, and had risen in the Northwest. Cloudy weather and local rains were reported from the Lake region, and from Tennessee and the Ohio valley. High NW. winds, maximum velocities 28 and 32 miles, were reported from Milwaukee and Grand Haven. Cautionary Signals were ordered up at Buffalo, Erie, Cleveland and Section Five, Sandusky, Toledo, Detroit and Port Huron on the lakes and at Cape May, Atlantic City, Barnegat and Sandy Hook on the New Jersey coast. At midnight the depression was central near Erie—Erie barometer, 0.24 in. below the normal. Light rains had fallen in the Lake region, the Middle Atlantic States and the Ohio valley, but in the latter district rain had ceased and clear weather was reported. High westerly winds, maximum velocity 29 miles, were reported from Sandusky. Cautionary signals were ordered for Lewes and New York and for stations on the New England coast from New York to Portland and the Cautionary signals on the New Jersey coast were changed to off-shore signals. Moving northeastward, the depression was central in Vermont on the morning of the 8th—Burlington barometer 0.31 in. below the normal. The barometer had risen in the Upper Lake region and on Lake Erie. Light rain had fallen in the Middle Atlantic States, New England and Ontario. Heavy rain accompanying a thunder-storm was reported from Boston. At the afternoon report the area was central in Maine, Portland barometer 0.34 in. below the normal. N. to W. winds prevailed in the Lake region and the Middle Atlantic States, and NW. to SW. winds in New England. The temperature had fallen rapidly, and the barometer

had risen in the Lake region, the Middle Atlantic States, the Upper Mississippi and Ohio valleys and in Tennessee. Cautionary Signals were ordered down at New York, at stations on the New England coast and at Buffalo, Erie, Cleveland and Section Five and Sandusky, having been justified on the lakes by maxima velocities of SW. 28 miles at Buffalo, W. 28 at Erie, W. 26 at Cleveland and W. 33 at Sandusky. At midnight the storm-center was northeast of Eastport, Eastport barometer 0.32 in. below the normal. N. to W. winds prevailed east of the Mississippi river, except in the Gulf and South Atlantic States. Cautionary Signals were ordered down at Detroit and Port Huron. On the morning of the 9th the depression was central in New Brunswick and thence, pursuing a northeasterly course, passed beyond the limit of the Canadian stations, and the pressures in New England, rapidly recovered under the influence of the area of high barometer then in the Lake region. The Off-shore Signals on the New Jersey coast, were ordered down on the afternoon of the 9th, having been justified by maximum velocities of wind, NW. 35 miles at Cape May, W. 32 at Sandy Hook. This storm was quite severe on Lake Erie, vessel captains reporting very rough weather and high winds on the lake.

No. IV.—During the 7th, the barometer fell at stations in Oregon and Washington Territory, and on the morning of the 8th an area of low barometer was present off the coast of Washington Territory, Olympia barometer, 0.25 in. below the normal. The temperature rose rapidly during the afternoon in eastern Idaho and Oregon and in northern Nevada, and fell rapidly in western portions of Washington Territory and Oregon, a fall of 17° in eight hours being reported from Olympia, and one of 18° from Portland. The barometer fell rapidly in Idaho and the eastern portion of Washington Territory, and the depression moving eastward was central northeast of Umatilla on the afternoon of the 8th, Umatilla barometer 0.20 in. below the normal. The barometer rose rapidly in rear of the depression, and light rains were reported from Olympia and Portland. During the evening the temperature rose in Montana, a rise of 20° being reported from Virginia City, and the depression moving southeastward was central, at the midnight report, near Boise City, Idaho, barometer 0.21 in. below the normal; thence moving eastward it was central northwest of Virginia City on the morning of the 9th, barometer 0.27 in. below the normal. At the afternoon report it was central in Montana—at this report, with the exception of light rains at Olympia, Wash. Ty., Portland and Roseburg, Oregon, and local rains in Texas and New England, clear or partly cloudy weather prevailed throughout the United States. So far, no precipitation had taken place in front of the depression. The temperature continued to rise rapidly in advance and fall rapidly in rear of the depression, which, at midnight, was in Dakota, Bismarck barometer 0.21 in. below the normal. Thunder-storms were reported from St. Louis and Cairo, elsewhere, except at a few of the Gulf stations, clear or partly cloudy weather prevailed. Moving southeastward, the depression was central in Kansas on the morning of the 10th, North Platte and Omaha barometers 0.21 in. below the normal. Cloudy weather was reported in the Lower Missouri valley and light rain was falling at Cairo and St. Louis. East of the Mississippi river, the pressures were above the normal, high area No. II. being central in the Lake region. NE. to SE. winds prevailed in the Lower Missouri valley and in Texas, and E. to S. winds in the Upper Mississippi valley and the Upper Lake region, and variable winds in the Lower Lake region; elsewhere, east of the Rocky Mountains, NE. to NW. winds prevailed. Moving slowly northeastward the area was central in southern Minnesota on the morning of the 11th. The pressure in the Upper Lake region, although still above the normal, had begun to give way, and the area of high barometer had moved eastward and was central over Lake Ontaria. Light southerly winds and clear weather prevailed in the Lake region. Partly cloudy weather and southerly winds, with light rains, were reported from the Upper Mississippi valley. Thunder storms were reported from Dubuque, Des Moines, and Leavenworth accompanied by heavy rain at the latter station. In the afternoon the area was central in eastern Minnesota. East of the Mississippi the pressure had fallen and the area of high barometer was central off the Middle Atlantic coast. West of the Mississippi the pressure had risen rapidly, cloudy weather and light rains were reported from the Upper Mississippi and lakes Superior and Michigan; elsewhere east of the Mississippi clear or partly cloudy weather prevailed. The winds in the Lower Missouri valley and the Northwest had veered to NW. and W., and E. to S. winds prevailed on the Upper Lakes. Moving northeastward the depression was central over Lake Michigan on the morning of the 12th, Marquette barometer 0.29 in. below the normal. The winds in the Lower Lake region had veered to southerly, brisk NW. to W. winds prevailed on lakes Michigan and Superior. The barometer had fallen decidedly in the Lake region and was below the normal in the Upper Lake region and the Upper Mississippi valley; elsewhere, excepting southern California, the barometer was above the normal. Cautionary signals were ordered for Alpena, Port Huron, Detroit, Section Four, Toledo, Sandusky, Cleveland, Section Five and Erie. Cloudy weather and rain continued on lakes Michigan and Superior. The winds in Texas had become northerly and cloudy weather and rain prevailed in that state. At the afternoon report of the 12th the depression was central north of Lake Huron, Alpena barometer 0.20 in. below the normal. The barometer had fallen rapidly over Lake Huron and in Ontario, a fall of 0.21 in. in eight hours being reported from Saugeen, and was rising rapidly in the rear of the centre. Cloudy and rainy weather were reported from Lake Erie, Tennessee and the Ohio valley. A thunder-storm, accompanied by heavy rain, was reported from Sandusky, and high westerly winds at Milwaukee and Alpena. At midnight the area was central near Parry Sound. On the morning of the 13th it was northeast of Rockliffe, after which it moved off to the northeast accompanied by light rains in the St. Lawrence valley and leaving a subsidiary depression in the Lake region.

No. V—was a subsidiary area which formed in rear of the area just described. While area No. IV was moving off to the northeast, the barometer continued falling over lakes Huron and Erie, and on the afternoon of the 13th an area of low barometer was formed, central to the west of Detroit, Mich. Partly cloudy or cloudy weather and light local rains prevailed east of the Mississippi river. Fresh southerly winds prevailed on the Atlantic coast, and NW. winds with rising barometer in the Upper Mississippi valley. The pressures were below the normal over lakes Michigan and Huron, the Lower Lake region, the St. Lawrence valley, the Middle Atlantic States, the Ohio valley, and the western portion of New England. The Cautionary Signals ordered in advance of area No. IV remained, and signals were ordered for Cape May, Lewes, Atlantic City, Barnegat, and Sandy Hook on the New Jersey coast. At midnight the area was central over Lake Erie. High winds and squally weather were reported from Sandusky and Cleveland. Cloudy weather and rain continued in the Lower Lake region, in New England, and in the Middle and South Atlantic States. Rain had fallen during the preceding eight hours in Tennessee and the Ohio valley, but it had ceased raining at the time of the report, and clear and cooler weather was reported. The temperature had risen in New England and the eastern portion of the Middle Atlantic States; elsewhere it had fallen. Cautionary Signals were ordered down at Toledo, Detroit, Section Four, Port Huron and Alpena. On the morning of the 14th the depression was central near Buffalo. Cloudy weather continued in the Lower Lake region, the St. Lawrence valley, and the Middle Atlantic States. A thunder storm with heavy rain was reported from Sandusky. The pressures in the Northwest were falling rapidly. High northerly winds were reported from Lake Huron. An area of high barometer was central near Cairo, and moving slowly eastward. The Cautionary Signal at Cape May was changed to Off-Shore. At the afternoon report of the 14th, the area was central in New Hampshire. The barometer had risen in the Lake region and had fallen in New England and the Northwest. The Cautionary Signals at Sandusky, Cleveland and Section Four were ordered down, and the Cautionary Signals at Barnegat, Sandy Hook, and Atlantic City were changed to Off-Shore Signals. The signals displayed on the lakes were justified by velocities of SW. 27 miles at Cleveland, NW. 32 miles at Sandusky and 25 miles at Alpena, but were lowered too soon at Port Huron. Cloudy and rainy weather continued in the St. Lawrence valley, on Lake Ontario, and in New England. The weather in the Lower Lake region and the Middle and South Atlantic States rapidly cleared under the influence of the area of high barometer then advancing from the west. On the morning of the 15th the area was central in New Brunswick, northwest of Chatham. On the afternoon it had disappeared. The Off-Shore Signals at Sandy Hook, Cape May, Atlantic City, and Barnegat were lowered, having been justified at all stations except Sandy Hook.

No. VI.—During the 13th, the barometer fell in the Northern and Middle Plateau districts, the Northern and Middle Eastern Rocky Mountains slopes and in the Northwest, and on the morning of the 14th, an area of low pressure was central in northern Montana. Low area No. V, was still in the Lower Lake region, and an area of high barometer was central near Cairo, Ill. Moving eastward, area No. VI was central in northeastern Dakota in the afternoon. South to east winds, with clear or partly cloudy weather, prevailed on lakes Michigan and Superior and in the Upper Mississippi valley. The winds in Lake Huron and the Lower Lakes were still under the influence of area No. V., and cloudy and rainy weather prevailed in these districts. Since last preceding report the barometer had fallen rapidly in the Northwest, and had risen rapidly in the rear of the center. Cautionary Signals were ordered for Duluth, Marquette and Escanaba. At midnight, signals were also ordered for Milwaukee, Section one, Chicago, Grand Haven and Section three. During the night of the 14th, the barometer fell rapidly in the Upper Mississippi valley and over the Upper Lakes, the most rapid fall 0.30 in. in eight hours occuring at Marquette. On the morning of the 15th the area was central over Lake Superior, Duluth and Marquette barometers 0.33 in. and 0.30 below the normals respectively. Low area No. V had moved to the northeast and was passing over the Canadian Maritime stations. The area of high barometer had moved eastward and was central in the Middle Atlantic States. The winds in the Lower Lake region had become southerly. The winds were still southerly in the Upper Lake region and the Upper Mississippi valley, with the exception of those at Duluth and St. Paul, which had shifted to NW. Northwest winds prevailed in the Lower Missouri valley and the Northwest, in which districts the pressure had rapidly increased and the temperature fallen slightly. Cloudy weather was reported in the Upper Lake region and light rains had fallen at Escanaba and Marquette, the rain at latter station accompanying a thunder storm. Cautionary Signals were ordered for Alpena, Detroit, and Section Four, Port Huron, Toledo, Sandusky, Cleveland, and Section Five. The winds on Lake Michigan were veering to westerly and high winds, velocities equaling or exceeding 25 miles per hour, were reported from Escanaba, Milwaukee, Grand Haven, and Alpena. At midnight the area was central over the eastern portion of Lake Superior. Clear or partly cloudy weather prevailed on the Upper Lakes, except on Lake Huron, where cloudy and rainy weather continued. Cautionary Signals were ordered down at Grand Haven and Section Three. Continuing to move eastward, the storm was central, on the morning of the 16th, in western Ontario, and at midnight was still in Ontario, its center being northwest of Parry Sound. In the afternoon Cautionary Signals were ordered down at Chicago, Milwaukee, Section One, Escanaba, Marquette, Duluth, Sandusky, Toledo, Cleveland, and Section Five, too soon for stations on the Lower Lakes, as high winds were subsequently reported from Sandusky and Cleveland. On the morning of the 17th, the area was central north of Quebec, barometer 0.51 in. below the normal. Cloudy weather continued in New England, the St. Lawrence valley and on Lake Huron. Light rains had fallen in these districts during the night of the 16th. The area moved northeastward, accompanied by cloudy weather and light rains, and disappeared on the afternoon of the 18th.

No. VII.—During the night of the 19th, and morning of the 20th, the barometer fell in Dakota and Montana, and at the afternoon report of the latter date, an area of low pressure was central in northwestern Dakota. Cloudy and rainy weather prevailed in the South Atlantic States, the weather in New England and the Middle Atlantic States was rapidly clearing, and in all other districts clear or partly cloudy weather prevailed. An area of high pressure was central in the Lake region. The temperature in the Upper Lake region and the Upper Mississippi valley, had risen rapidly during the past eight hours. E. to S. winds prevailed in the Upper Mississippi and Lower Missouri valleys and N. to W. winds in Montana Cautionary Signals were ordered for Duluth, Milwaukee and Section One. At midnight, the area was central south of Bismarck, at which station the barometer had fallen 0.19 in. within eight hours. Light rain was reported from Duluth. The barometer continued falling in Dakota during the night of the 20th, and the depression moving eastward was central southeast of Breckenridge on the morning of the 21st, and at midnight of the same date was in southern Minnesota. The morning map of the 22nd showed a shallow trough of low pressure extending southwestwardly from Lake Superior to Texas. The barometer continued to fall most rapidly in the Upper Lake region, in which district cloudy weather continued with light rains. Cautionary Signals were ordered down at Duluth. During the 22nd the barometer rose in the Northwest, the Upper Mississippi, the Lower Missouri and Ohio valleys, in Tennessee and the Eastern Gulf States, and the trough was divided into two weak areas of low barometer, one of which was central in Ontario northeast of Alpena, and the other central in northern Texas rapidly filled up and disappeared. The Cautionary Signals at Milwaukee and Section One were ordered down. They were not justified. Moving eastward, the depression was central north of Parry Sound on the morning of the 23rd. S. to W. winds prevailed on the Lower Lakes and in the St. Lawrence valley. Cloudy weather and light rains continued in the latter district. Since the morning of the 21st the barometer had been slowly rising in the extreme Northwest, and on the afternoon of the 23rd an area of high barometer was advancing to the southeast over Manitoba, Pembina barometer 0.30 in. above the normal. High northwest winds were reported from Marquette and Escanaba. Cautionary Signals were ordered for Milwaukee, Section One, Chicago, Alpena, Grand Haven and Section Three. N. to NW. winds were reported from the Upper Lakes and S. to W. winds from the Lower Lakes, Middle Atlantic States and New England. At midnight the low area was central near Father Point, barometer 0.19 below the normal. High NW. winds, maximum velocity 30 miles, were reported from Sandusky. The temperature had fallen and the barometer risen during the past 24 hours in the Northwest, the Upper Lake region and the Upper Mississippi valley, and light rains were reported from the Canadian Maritime stations, the St. Lawrence valley, the Lower Lake region, Lake Huron and the Ohio valley. Cautionary Signals were ordered up at Cape May and Sandy Hook on the New Jersey coast, at Buffalo, Rochester and Erie on the lakes. Moving nearly due south the depression was central west of Chatham on the morning of the 24th. The area of high barometer in the Northwest had advanced southeastward and was central in the Lower Missouri valley. The Cautionary Signals at Cape May and Sandy Hook were changed to Off-shore, and Off-shore Signals were also ordered for Atlantic City and Barnegat. The area was central south of Chatham at the afternoon observation, at which time Cautionary Signals were ordered up at Oswego and Section Six. At midnight the depression was central over the Gulf of St. Lawrence. Cautionary signals were ordered down at Chicago, Milwaukee, Section One, Sandusky, Toledo, Alpena, Grand Haven and Section Three. The morning report of the 25th showed that the depression had passed northeastward beyond the Candian Maritime stations, and Cautionary signals were ordered down at Cape May, Sandy Hook, Atlantic City, Barnegat and at the lake stations, and Off-shore signals were ordered up for Newport, Wood's Holl, Boston, Section Eight, Portland, Section Seven and Eastport. The signals displayed on the lakes were justified at Detroit, Section Four, Toledo, Sandusky and Cleveland Maximum velocity of wind NW. 36 miles at Sandusky. The Off-shore signals on the New England coast were lowered at the afternoon observation. They were not justified.

No. VIII.—During the 23rd, 24th and 25th a depression advanced eastward from the Pacific coast but its path was not well enough defined to be accurately charted. On the morning of the 26th it was central in eastern Dakota. Generally clear weather prevailed throughout the United States. East of the Mississippi river, in the Northwest and in the Lower Mississippi valley, the temperatures were below the normal, and frosts were reported from the Middle and South Atlantic States. From the 26th to the end of the month the pressure remained low in the Northwest and severe local storms were reported from that district. Niles, Mich., was visited on the 26th by a very severe thunder-storm—houses, barns, hay-ricks and trees were struck by lightning, the telegraph operators were driven from their offices and the instrument destroyed; a number of barns were burned and many cattle and horses killed. The area remained nearly stationary in the Northwest, and at midnight of the 30th was still central in that district. Cautionary signals were ordered up at Chicago, Milwaukee, Section One, Escanaba, Marquette, Duluth, Alpena, Grand Haven and Section Three on the afternoon of the 25th, and at Erie, Cleveland, Section Five, Sandusky, Toledo, Detroit, Section Four and Port Huron on the morning of the 27th. These signals were lowered on the afternoon of the 30th, having been fully justified on the Upper Lakes by velocities of SW. 25 miles at Alpena, SW. 36 miles at Grand Haven, NE. 36 miles at Duluth and SW. 34 miles at Milwaukee. Rough weather prevailed on the Upper Lakes during the display of the signals. The signals were not justified on the Lower Lakes.

No. IX.—Between midnight of the 29th and the morning observation of the 30th the barometer fell rapidly in Oregon and Washington Territory, and on the morning of the 30th an area of low pressure was

central off the west coast of Washington Territory, Portland barometer 0.25 in. below the normal, a fall of 0.26. in. in 8 hours. The barometer continued to fall rapidly in Oregon and Washington Territory, a fall of 0.32 in. in 8 hours being reported from Olympia at the afternoon observation. The depression extended itself rapidly to the eastward, and at the midnight report the barometer at Virginia City, Montana, was 0.39 in. below the normal.

INTERNATIONAL METEOROLOGY.

Three International Charts, Nos. IV, V and VI, accompany the present *Review*. No. IV indicates the probable course of low pressure areas over the North Atlantic Ocean and neighboring waters and continents from the latter part of July to the end of August, 1879, and is based upon data received at this office up to Sept. 30th, 1879. As the title implies, it is not intended for this chart to be considered as anything more than approximately correct, and it is probable that fuller data will change portions of it. Nos. V and VI are based upon the International Simultaneous Observations as described in the *Review* for July, 1879, supplemented by such other observations as have been considered sufficiently trustworthy. Among the latter may be mentioned the observations made on board vessels over the North Atlantic Ocean and published in the Monthly Weather Review of the German Naval Observatory, which have been specially valuable in the tracing of tracks on Chart No. VI.

On Chart No. IV. the tracks of twelve areas of low pressure are traced, and in the upper right-hand corner is a small index giving the first and last dates of each area. Areas No. I, IV, VI, X, and XI are prolonged tracks of areas that have already appeared on Charts No. I of July and August REVIEWS, and should, in accordance with the explanatory note at the foot of map, have been printed partly in black, but owing to an oversight have been printed wholly in red. Three of these, Nos. I, VI, and XI, probably crossed the Atlantic as indicated and materially affected the weather of northwestern Europe during the month of August. Nos. II, III, VIII and IX can not at present be traced further than shown on map. No. V probably existed on the North Carolina coast on August 9th, and moving northeastward produced hurricane winds off the coast of Nova Scotia on the 10th and 11th. No. VI is identical with area No. VII, Chart I, *August Review;* reports already received indicate that this storm existed on the 13th, about in the position shown. On this day (13th) a vessel in 20° N., 60° W., reported rapidly falling pressure, easterly winds, thunder, lightning, and rain, the day ending with heavy squalls, torrents of rain, and severe lightning. At St. Thomas during the 13th, cirrus clouds moved rapidly from the east, and at 1 a. m. of the 14th, heavy rain, thunder, and lightning occurred. Observations made on the island of Grand Turk (21° 32′ N., 71° 10′ W.) at 10 a. m. give the lowest barometric pressure (29.75) of the month on the 15th, accompanied by a strong NE wind and heavy rains; the latter ranging from 2.10 to 2.23 inches, or about one-half of the entire rain-fall of the month, at Cockburn Harbor, Salt Cay, and Grand Turk. During the day the wind changed to a heavy SE gale, during which the brig "Helen," lying at East Harbor, Turk's Island, loaded and ready for sea, was obliged to slip her chains, after which she drifted ashore. At Santiago de Cuba, heavy showers fell during the night of the 15th and on the 16th, with SE. squalls. On the 16th, Brig "Dashaway" had a severe hurricane, lasting 10 hours, when 20 miles east of Watling's Island, and Steamer Pomona (from Jamaica to New York, and on the 14th, in 19° 45′N, 75° 50′ W) reports, 16th, had hurricane from NE. to SSW., blowing with great violence, and a very heavy cross sea, lasting 13 hours. From the 17th to the 19th, this storm was fully described in the *August Review*; it has not been traced after the 20th, on which day it was over Newfoundland. Nos. VII and XII are based upon the reports of severe storms on the dates and in the positions indicated. No. X is a prolongation of area No. IX, Chart I, *August Review*; it was encountered by Bark Elvira, when 50 miles east of the Alacran Reefs. This vessel reports a severe cyclone from ENE on the 20th, which ended next day at 4 p. m. with wind SSE; it was attended by very high seas and terrific squalls. The heavy rains, reported to have ruined the corn crop, in the State of Tabasco, Mexico, may have accompanied this storm. From the 22nd to the 26th, this storm is fully described in the *August Review*—and as there indicated, it probably continued off the Atlantic coast during the 27th. From the 28th to 31st, it passed northeastward, but does not appear to have been accompanied by very severe winds; on the 29th, the Brig Casarina, 41° N, 66° W, was struck by a "whirlwind, commencing at N. and veering to W. and NE. lasting one hour."

Southern Hemisphere.—Since the publication of the *August Review* the following reports of severe storms in the Southern Hemisphere have been received: *South Atlantic Ocean.*—From June 23rd to 28th, severe storms prevailed along the coast of South America from Montevideo to Cape Horn; at Montevideo the direction of the wind at first (on the evening of the 23rd) was S. by W., hauling to SSE. on the 24th, and backing to SSW. on the 25th; greatest force of wind, estimated, 11 to 12 from the SSE.; barometer fell to 29.78 on the 23rd and to 29.86 on the 25th and heavy rains, with thunder and lightning, fell on the 24th and 25th. It is reported as the heaviest southeaster experienced at Montevideo for years and much damage resulted to the city and to small craft in the inner harbor; bark Syra was driven ashore and lost. Bark Balmore from England to San Francisco had a strong gale on June 25th, during which a heavy sea threw the vessel on her beam ends, in which position she remained until the 28th when she was in 57° 54′ S., 68° 38′ W. June 26th, 1879, ship Frank T. Curling, from Liverpool to Callao, encountered heavy gales when off Cape Horn, and, on the 27th, during a lull in the storm the crew abandoned the vessel and, on the morning of the 28th, were taken on board ship John de Costa, barely in time to escape a renewal of storm; the aban-

doned vessel foundered on the 28th 250 miles southwest of Cape Horn. *South Pacific Ocean.*—On June 29th, 1879, severe SE. gales prevailed on the coast of New Zealand, during which ship B. L. and brig Akbar were driven ashore. *Indian Ocean.*—On June 19th, 1879, ship St. Charles, while off south end of Madagascar, had cyclone lasting 12 hours, during which the wind veered from ENE. to SSE. From June 30th to July 7th, severe westerly gales and high seas were experienced off the Cape of Good Hope.

TEMPERATURE OF THE AIR.

The isothermal lines upon Chart No. II., show the general distribution of the temperature for the month of September, 1879, accompanying which is a table of comparative temperatures. The temperature has been decidedly below the normal over the eastern section of the country. This deviation has been least along the immediate Atlantic coast, from Cape May to Eastport, while over Nova Scotia and Cape Breton the temperature has been slightly in excess. Over the Southern States east of the Mississippi and in Arkansas, Missouri, Iowa, Dakota, and northern Michigan, the deviation has ranged from 1° to 2°, while over the Upper Mississippi and Ohio Valleys and larger part of the Lake Region the mean temperature of the month has been from 3° to 4° below the average of the past seven or eight years. Over the northern portion of Texas and Indian Territory and over the Rocky Mountain Region and Western Plateau a decided excess in temperature has occurred, amounting to 5° at Corsicana and on the summit of Pike's Peak; 4°.7 at Salt Lake City; 6°.2 at Virginia City; and 6°.8 at Boise City. The highest and lowest temperatures, as recorded during the month, by the maximum and minimum thermometers in use at the Signal Service stations show the temperature to have risen above 100° over the interior of California, southern portion of Arizona, and interior of Texas; over 90° at stations on the Western Plateau, (except Pioche, 88°) in New Mexico, over the eastern slope of the Rocky Mountains as far north as Nebraska, as well as over portions of Montana and Dakota, along the Gulf and Atlantic coasts and over the western portions of Pennsylvania and New York; to or over 80° at all other stations except Breckenridge, Duluth, St. Paul, Marquette, Escanaba, Grand Haven, and outlying stations on the immediate coast of New England. The highest temperatures occurred in California from the 11th to the 16th; in the Lower Missouri, Upper Mississippi and Lower Ohio valleys, and Upper Lake Region from the 26th to the 30th; elsewhere very generally from the 1st to the 10th. The highest recorded was 113° at Yuma, Arizona. The minima show the temperature to have fallen below 30° from Montana and Wyoming to northern Minnesota and over the northern part of Lower Michigan; below 40° over northern Nevada, Idaho, and from Northern Colorado to the interior of the Middle States and New England, except along the southern shore of Lake Erie; below 50° at elevated stations in California, and from Nevada to New Mexico, Missouri, and northern portions of Georgia and South Carolina; and below 60° at all stations except those in the Lower Rio Grande Valley, along the immediate Gulf coast, and at Jacksonville, Fla. From the Northwest to the Atlantic coast the lowest temperatures were experienced from the 23rd to the 27th; over the Southwest from the 13th to 20th, and over California and the Western Plateau from the 23rd to the 30th. The three lowest recorded were 20° on summit of Pike's Peak; 19° at Pembina; and 11° on the summit of Mt. Washington. Below are given the highest and lowest temperatures observed by Signal Service and voluntary observers, arranged by States, those by voluntary observers being marked with a (*) star.

Minima Temperatures.—Maine: 26° at *Orono and 37° at Eastport. *New Hampshire:* 11° at Mount Washington. *Vermont*: 30° at *Lunenburg and *Strafford. *Massachusetts*: 30° at *Amherst, *Rowe, *Waltham and 31° at Springfield. *Rhode Island*: 41° at Newport. *Connecticut*: 34° at *Southington. *New York*: 26° at *Nile and 33° at Albany. *Pennsylvania*: 22° at *Wellsboro and 35° at Pittsburgh. *Delaware*: 48° at *Dover. *Maryland*: 34° at *Woodstock, *New Market, *Emmittsburg and 40° at Baltimore. *District of Columbia*: 38° at Washington. *Virginia:* 32° at *Snowville, and 38° at Fort Whipple. *West Virginia*: 39° at Morgantown. *North Carolina*: 36° at *Ashville, *Franklin and 43° at Charlotte. *South Carolina*: 46° at *Spartanburgh and 54° at Charleston. *Georgia*: 44° at Atlanta. *Florida*: 60° at St. Marks. *Alabama*: 46° at *Wilsonville and 53° at Montgomery. *Mississippi*: 57° at Vicksburg. *Louisiana*: 55° at Shreveport. *Texas*: 45° at Davis. *Ohio*: 31° at Westerville and 37° at Columbus. *Kentucky*: 44° at Louisville. *Tennessee*: 42° at Nashville and *Ashwood. *Arkansas*: 45° at *Mount Ida. *Michigan*: 30° at *Thornsville, *Lansing, Grand Haven and Alpena. *Indiana*: 34° at *Logansport and *Wabash. *Illinois*: 30° at *Elmira and 39° at Chicago. *Missouri:* 38° at *Corning and 41° at St. Louis. *Kansas*: 32° at *Holton and 43° at Leavenworth. *Wisconsin*: 23° at *Neillsville and 35° at Milwaukee. *Iowa*: 24° at *Ames and 34° at Des Moines. *Nebraska*: 28° at *De Soto and 34° at North Platte. *Indian Territory*: 46° at Fort Sill. *Minnesota*: 24° at Breckenridge. *Dakota*: 19° at Pembina. *Colorado*: 20° at Pike's Peak and 38° at Denver. *New Mexico*: 42° at Santa Fe and La Mesilla. *Wyoming*: 30° at Cheyenne. *Utah*: 33° at *Coalville. *Nevada*: 33° at Winnemucca. *Arizona*: 44° at Prescott. *Idaho*: 36° at Boise City. *California*: 32° at Campo, 47° at Los Angelos, 52° at San Francisco and Sacramento. *Oregon*: 39° at Roseburg.

Maxima Temperatures.—Maine: 85° at Portland. *New Hampshire:* 89° at *Grafton. *Vermont*: 85° at Burlington. *Massachusetts:* 89° at Boston. *Rhode Island:* 76° at Newport. *Connecticut:* 82° at New Haven. *New York:* 90° at Rochester and 95° at *Waterburg. *Pennsylvania:* 90° at Pittsburgh and 94° at *Wellsboro. *Delaware:* 82° at *Dover. *Maryland:* 85° at Baltimore. *District of Columbia:* 87° at Washington. *Virginia*: 90° at Norfolk. *West Virginia:* 84° at Morgantown. *North Carolina:* 92° at Wil-

Those marked with * are voluntary reports.

mington. *South Carolina:* 89° at Charleston. *Georgia:* 91° at Augusta. *Florida:* 90° at Jacksonville and 91° at Key West. *Alabama:* 91° at Mobile. *Mississippi:* 93° at Vicksburg. *Louisiana:* 95° at *Okalooska. *Texas:* 104° at *Mesilla. *Ohio:* 88° at *Bellefontaine, *Ruggles and *Ringgold. *Kentucky:* 83° at Louisville. *Tennessee:* 88° at Knoxville. *Arkansas:* 88° at Little Rock. *Michigan:* 85° at Alpena. *Indiana:* 80° at Indianapolis and 84° at *Laconia. *Illinois:* 86° at *Peoria and *Anna. *Missouri:* 93° at *Independence. *Kansas:* 97° at *Holton. *Wisconsin:* 82° at *Beloit. *Iowa:* 90° at *Vail. *Nebraska:* 93° at *Howard. *Indian Territory:* 95° at Fort Sill. *Minnesota:* 78° at St. Paul. *Dakota:* 95° at Ft. Buford. *Colorado:* 89° at Denver. *New Mexico:* 105° at La Mesilla. *Wyoming:* 87° at Cheyenne. *Utah:* 91° at Salt Lake City. *Nevada:* 97° at *Carson City. *Arizona:* 113° at Yuma. *Idaho:* 92° at Boise City. *California:* 92° at San Diego and 105° at Red Bluff. *Oregon:* 90° at Roseburg.

Ranges of Temperature at Signal Service Stations.—The *monthly ranges* will appear from an examination of the maxima and minima just given. The greatest *daily ranges* vary in New England from 16° at Wood's Holl to 19° on Mt. Washington and 29° at Boston; Middle Atlantic States, from 20° at Barnegat to 33° at Washington; South Atlantic States, from 13° at Portsmouth, N. C., to 25° at Jacksonville, and 31° at Charlotte; Gulf States, from 13° at Key West to 17° at New Orleans and 33° at Corsicana; Ohio valley and Tennessee, from 25° at Cairo, Louisville and Cincinnati to 37° at Pittsburgh and Knoxville; Lower Lake region, from 20° at Toledo to 30° at Rochester; Upper Lake region, from 23° at Madison to 30° at Chicago and Duluth and 33° at Alpena; Upper Mississippi valley, from 24° at Springfield, Ill., to 31° at St. Paul and 33° at Des Moines; Lower Missouri valley, from 30° at Leavenworth to 38° at Yankton; Northwest, from 41° at Bismarck to 46° at Pembina; Eastern Rocky Mountain slope, from 31° at Denison, 38° at Fort Sill to 35° at Deadwood and 46° at North Platte; Rocky Mountains, from 26° on Pike's Peak to 40° at Santa Fé and 44° at Cheyenne; Plateau Districts, from 34° at Pioche to 39° at Boise City and 54° at Winnemucca; California, from 26° at San Francisco to 36° at Los Angeles and 40° at Red Bluff and Visalia.

Frosts—were quite frequent over the northern portions of the country, and during the latter part of the month very generally destructive to vegetation, as will be seen from the following summary: On the 26th and 27th, they were experienced as far south as Tennessee, Georgia and South Carolina. In New England frosts occurred on the 5th, 7th, 10th and from the 20th to 27th, and were destructive to vegetation on the 21st, 25th, 26th and 27th. In New York and Pennsylvania, from the 4th to the 28th; destructive, 11th, 12th, 21st, 25th, 26th, 27th. Maryland, Virginia and West Virginia, 10th, 11th, 25th, 26th, 27th. North Carolina, 24th, 25th, 26th, 27th, 28th. South Carolina and Georgia, 26th and 27th. Tennessee, 14th and 26th. Ohio valley, 5th, 9th, 10th, 11th, 15th, 19th, 21st, 25th 26th; destructive, 15th, 25th and 26th. Lower Lakes, 4th to 29th; destructive, 11th, 12th, 24th and 25th. Upper Lake region, 5th, 7th, 8th, 9th, 10th, 11th, 15th, 17th to 26th; destructive, 5th, 7th, 19th, 20th, 21st, 24th, 25th. Upper Mississippi valley, 4th to 26th; destructive, 14th, 19th, 20th, 24th, 25th and 26th. Lower Missouri valley, 6th, 8th, 12th, 13th, 17th, 18th, 20th, 24th; destructive, 20th and 24th. Extreme Northwest, 3rd, 4th, 5th, 7th, 8th, 12th, 18th, 19th, 20th, 22nd, 23rd, 24th, 29th, 30th. Colorado, at Summit, every night; summit of Pike's Peak, 3rd, 12th, 13th, 20th, 25th. Idaho, 11th, 12th, 30th. Utah, 26th, 27th. Nevada, 11th, 12th, 13th, 27th, 30th.

Ice occurred as follows:—On the 9th, at Neillsville, Wis., $\frac{1}{8}$ of an inch in thickness. 12th, Winnemucca, Nev. On the 13th, at Pembina, on pools. 14th, Cresco, Ia., $\frac{1}{16}$ in., and at Port Madison, Ia., $\frac{1}{8}$ in. 17th, Idaho City, Idaho. 19th, Cresco, Ia., $\frac{1}{4}$ in., Nora Springs, Ia., and Litchfield, Mich. 20th, Belvidere, Ill., Litchfield, Mich., Plattsmouth and Genoa, Neb., and Burlington, Ia. 21st, Litchfield, Mich., and Waterburg, N. Y. 23rd, Logansport, Ind.; Pembina, 1 inch; Clear creek, Neb. 24th, Muscatine and Burlington, Ia.; Independence, Ia., $\frac{1}{8}$ in.; Niles, Mich., $\frac{1}{4}$ in.; Litchfield and Ypsilanti, Mich.; Howard, Genoa and Clear Creek, Neb.; Pembina; Hanover, N. H. 25th, Elmira, Ill.; Belvidere, Ill., $\frac{1}{3}$ inch; Wabash, Ind.; Litchfield and Hudson, Mich.; Ashley, Mo.; Ithaca, N. Y., $\frac{1}{4}$ inch; Nile, N. Y., $\frac{1}{8}$ in.; Urbana, Ohio; Pittsburg, $\frac{1}{16}$ in.; Burlington, Vt. 26th, Gardiner, Me.; Eastport, $\frac{1}{8}$ in.; Westborough, Mass., $\frac{1}{8}$ in.; Linden and Somerville, N. J.; Waterburg and Palermo, N. Y.; Hulmesville, Pa.; Woodstock and Burlington, Vt, $\frac{1}{4}$ in; Contoocookville, N. H., $\frac{1}{2}$ in. 27th, Coalville, Utah, $\frac{1}{4}$ in. 30th, Winnemucca.

Ground was frozen on the 24th at Litchfield, Mich.; on the 25th, at Contoocookville, N. H., Williston Vt., and Litchfield, Mich.; 26th, at Strafford, Vt.; Dyberry, Pa., to a depth of 1 inch.

PRECIPITATION.

The general distribution of rainfall for the month is illustrated as accurately as possible on Chart No. III, from about 500 Signal Service and voluntary reports; it is accompanied by a table giving the average precipitation for the month of September by districts, which shows the rainfall for the month to have been in excess in the South Atlantic and Eastern Gulf States, and on the coast of Oregon. In the Northwest and the Middle Atlantic States, this table shows a decided deficiency, but by reference to the chart, other extensive areas, not included in these districts, will be found to have experienced a great want of rain, which, however, in taking an average of the district, have been compensated for by heavy rains in some other portions of the same district. Thus in the Eastern Gulf States, while a large part of Mississippi had over six inches portions of Albama and Georgia had less than one inch, and this applies to nearly all the different sections. In conequence of this uneven distribution of rain, severe droughts have occurred and great loss has resulted to stock and crops. This is especially the case in portions of Pennsylvania, Virginia and North Carolina, in Illinois, Missouri, Indian Territory and Texas and in Utah. Special reference to these will be found under the proper heading.

Special Heavy Rains.—On the 1st and 2nd, at Vicksburg, Miss., 3.99 inches; Ashwood, Tenn., 4.00 in.; Brookhaven, Miss., from 5 a. m. of the 1st, to 4 a. m. of the 2nd, 6.05 in.; St. Marks, Fla., 4.08 in. 1st to 3rd, Arlington, Ind., 3.85 in.; Laconia, Ind., 4.80 in.; St. Meinrad, Ind., 5.35 in.; Fort Wayne, Ind., 4.30 in.; Margaretta, Ohio, 3.19 in.; Nashville, Tenn., 3.83 in.; Indianapolis, Ind., 5.09 in.; Louisville, Ky., 3.55 in. 2nd and 3rd, Detroit, Mich., 3.88 in. 5th, Waterville, Kan., 1.94 in. in 2½ hours. 7th and 8th, Alpena, Mich., 3.68 in. 8th, St. Marks, Fla., 1.98 in. in 2 hours 40 minutes. 9th, San Antonio, Tex., 2.40 in. 10th, Booneville, Mo., 2.55 in. 11th, Corning, Mo., 3.30 in.; Indianola, Tex., 3.79 in. 11th to 13th, Brookhaven, Miss., 3.90 in.; St. Augustine, Fla., 3.32 in. 13th and 14th, Gulf Hammock, Fla., 4.25 in. 18th and 19th, Key West, Fla., 4.20 in. 20th and 21st, Cape Hatteras, N. C., 5.25 in. Cape Lookout, N. C., 5.06 in.; Wilmington, N. C., 4.26 in.; Charleston, S. C., 4.42 in. 24th, Brownsville, Tex., 4.02 in. 26th, Daytona, Fla., 2.98 in. Rio Grande City, Tex., 1.93 in. in 35 minutes. 26th and 27th, Niles, Mich., 3.10 in. 28th and 29th, Socorro, N. M., 1.94 in.

Largest Monthly Rain-falls.—Punta Rassa and Daytona, Fla., 13.78 inches; Brownsville, Tex., and Cape Hatteras, N. C., 11.64; Mayport, Fla., 11.51; Okahumpka, Fla., 10.50; Brookhaven, Miss., 9.95; St. Marks, Fla., 9.82; Key West, Fla., 9.71; Fayette, Miss., 9.00; Gulf Hammock, Fla., 8.97; Cape Lookout, N. C., 8.82; Jacksonville, Tenn., 8.24; Alpena, Mich., 8.00; Fayetteville, N. C., 7.75; Indianola, Tex., 7.27.

Smallest Monthly Rain-falls.—Within the limits of the lines marked zero upon Chart No. III, and embracing portions of California, Nevada, Colorado and Wyoming, only one station (Truckee in the Sierra Nevadas) reports any rain-fall. The following stations report very small monthly rain-falls:—San Francisco, and Red Bluff, Cal., Pioche, Nev., and Fort Buford, a trace; Winnemucca and Salt Lake City, 0.01; Denver, Col. 0.02; Hermosa, Col., Fort Custer, Mont., and Pilot Point, Texas, 0.03; Fort Stevenson, Dak., 0.06; Bismarck, Dak., 0.07; Battle Mountain, Nev., 0.08; Graham, Texas, 0.09; Stockton, Texas, Beowawe and Carlin, Nev., 0.10; Yuma, Arizona, 0.11; Clarksville, Texas, 0.13; Boise City, Texas, 0.14; Albuquerque, N. M., 0.20; Knoxville, Tenn., 0.22; Henrietta, Texas, 0.24; Melissa, Texas, 0.25; Forsythe, Mo., 0.30; Deadwood, Dak., 0.32; Coleman, Texas, 0.37; Little Rock, Ark., 0.39; Dover, Del., Rockford, Ill., Mount Ida, Ark., and North Platte, Neb., 0.40; Fort Keogh, Mont., 0.44; Accotink, Va., 0.45; Fort Sill, Dak., 0.47; Snowville, Va., and Bolivar, Mo., 0.50; Virginia City, M. T., 0.51; McKavett, Tex., and Fort Warren, Mass.. 0.52; Charlotte, N. C., 0.53; Okalooska, La., 0.55; Fort Gibson, I. T., 0.60; Prescott, Ariz., and Springfield, Mo., 0.68; Webster and Asheville, N. C., 0.70; Fort McPherson, Neb., 0.72; Tucson, Ariz., 0.74; Ringgold, Ohio, 0.81; Greensboro, N. C., 0.85; West Point, N. Y. and Corsicana, Texas, 0.88; Cairo, Ill., 0.93.

Rainy Days.—The number of days on which rain or snow has fallen varies as follows: New England, from 8 to 16; Middle Atlantic States, 6 to 10; South Atlantic States, 6 to 19; Eastern Gulf States, 7 to 22; Western Gulf States, 1 to 10; Ohio valley and Tennessee, 4 to 9; Lower Lake region, 12 to 18; Upper Lake region, 11 to 20; Upper Mississippi valley, 6 to 13; Missouri valley, 1 to 8; Red River of the North valley, 7 to 9; Eastern Rocky Mountain slope, 1 to 9 in Texas, 1 to 3 in Indian Territory, and 1 to 4 thence northward to Dakota; Rocky Mountains, 0 to 4; Plateau Districts, 1 to 2; California, 0 to 1; coast of Oregon and Washington Territory, 5 to 10.

Cloudy Days.—The number varies in New England, from 2 to 18; Middle Atlantic States, 4 to 8; South Atlantic States, 7 to 16; Eastern Gulf States, 5 to 13; Western Gulf States, 0 to 9; Lower Lake region, 8 to 11; Upper Lake region, 5 to 11; Ohio valley and Tennessee, 2 to 10; Upper Mississippi valley, 3 to 7; Missouri valley, 0 to 8; Red River of the North valley, 4 to 5; Eastern Rocky Mountain Slope, 0 to 8 in Texas; 0 to 3 in Indian Territory, and 1 to 4 northward to Dakota; Rocky Mountains, 0 to 4; Plateau Districts, 0 to 2; California, 0 to 3; coast of Oregon and Washington Territory, 7 to 9.

Hail fell on Pike's Peak on the 3rd, 10th and 19th; at Ft. Davis, Tex., 30th; Logansport, Ind., 18th; Madison, Wis., 16th; Alpena, 7th; New Haven, 8th; Ft. Brady, Mich., 17th and 20th; Summit, Col., 18th; Belvidere, Ill., 27th; Anna, Ill., 7th; Cresco, Iowa, 11th and 28th; Halton, Independence and Wellington, Kans., 11th; Fall River, Mass., 11th; Detroit, Ypsilanti and Kalamazoo, Mich., 13th; Kansas City, Mo., 12th; De Soto, Neb. 11th; Grafton, N. H., 17th; Princeton. N. J., 14th; Argyle, N. Y., 17th; Norwalk, Ohio, 13th; Lunenburgh, Vt., 17th; Helvetia, W. Va., 7th; Portland, Or., 29th; Virginia City, 28th; Albany, Or., 9th.

Snow fell on the summit of Mt. Washington on the 20th and 24th; 25th, snow squalls, during which two inches of snow fell, occurred on the mountains near Strafford, Vt., and o. the 29th snow fell on the mountains near Burlington, Vt.; on the summit of Pike's Peak, 8th, 23rd, 24th, 27th (very heavy snowstorm,) 28th and 29th; Colorado Springs, Col., 27th; near Ft. Garland, Col., 27th on the summits of Sierra Blanco and Baldy; Virginia City, Mont., 10th.

Depth of snow on ground at end of month.—On the summit of Pike's Peak 1 to 6 inches.

Droughts were severe and extensive. The observer at Litchfield, Pa., reports a severe drought throughout the month; at Wellsboro, Pa., on the 30th, wells and streams were exhausted, pasturage a failure, and farmers were already compelled to feed their stock with hay; at Mt. Solon, Va., dryest season experienced for thirty years, water transported from distant points. The observer at Belvidere, Ill., reports on the 30th that since August 10th there has been a continued scarcity of water, and crops and pastures are drying up.

The Missouri Weather Service reports an unusual drought over a tract of country within a radius of fifty miles of Springfield, resulting in the drying up of streams and wells, causing great inconvenience to stock raisers. At Ft. Gibson, Indian Ty., on the 10th, late vegetation was withering and becoming parched; streams and wells dry; on the 30th the long-continued drought was a suming very serious proportions. At Clarksville, Tex., it was the warmest September for the past ten years, and resulted in a very severe drought; only 0.13 inches of rain has fallen since the 9th of August. At Melissa, Tex., it was dry, dusty, and smoky from the 14th to 29th, and wells, streams, and cisterns became exhausted. At Corsicana, on the 30th the severe drought still continued. At Kanab, Utah, from 1st to 27th, drought was very severe; cattle are dying for want of water and food. Many streams exhausted which have not failed before since the country has been settled; the ground is very dry, and when ploughed up appears like ashes. At Coalville, Utah, 30th, excessive drought throughout the month; all crops a failure; everything suffering for water.

Floods.—Brookhaven, Miss., 1st and 2nd, heavy freshets doing great damage to crops, fences, &c; the loss of stock was very great; sheep, hogs and cattle were seen floating past Monticello, on Pearl river, for three or four days, at which place the water rose 19 feet in ten hours. St. Mienrad, Ind., 1st to 3rd, high water in creeks causing great damage to fences, cord-wood, lumber, &c. Frankfort, Ky., 2nd, heavy rain at night, doing much damage by flooding. Bardstown, Ky., 5th, heavy floods doing much damage.

Waterspouts.—At Newport, R. I., on the 11th, about 11 a. m., a waterspout was observed over the sea about 8 miles from shore, followed at 11:40 a. m, by a thunder storm at station, and at New Haven, Conn., also on the 11th, about 6 p. m., a waterspout was observed over the Sound about 6 miles from the mouth of the harbor. It was plainly visible for half an hour, and appeared to moved very slowly, when the approaching darkness shut it out from view. At Key West on the 24th, between 2 and 3 p. m., a waterspout was observed in harbor about 3 miles from shore.

RELATIVE HUMIDITY.

The percentages of mean Relative Humidity for the month range as follows: New England, 67 to 68; Middle Atlantic States, 66 to 83; South Atlantic States, 65 to 80; Eastern Gulf States, 69 to 83; Western Gulf States, 54 to 82; Ohio valley and Tennessee, 62 to 74; Lower Lakes, 67 to 73; Upper Lakes, 63 to 73; Upper Mississippi valley, 59 to 68; Lower Missouri valley, 51 to 59; Red River of the North valley, 66 to 73; Rocky Mountain Slope, 21 at Stockton, Tex., 72 at Boerne, Tex., 52 at Ft. Sill, 46 at Deadwood and 49 at Ft. Keogh; Plateau districts, 13 to 39; California, 34 to 79; Oregon, 68 to 70. *High stations* report the following averages, not corrected for altitude: Mt. Washington, 90.8; Pike's Peak, 46.5; Denver, 34.6; Santa Fe, 27.2; Cheyenne, 29.3.

WINDS.

The prevailing winds, at the Signal Service stations, are shown by the arrows flying with the wind on chart No. II. The prevailing direction is from the area of highest pressure, thus, over the South Atlantic States it is decidedly northeast, over the Gulf States, easterly, and over the Lower Lakes, Middle States and New England, southerly. In the Ohio valley and Upper Lake region, and over the Northwest and western Plateau, southerly and westerly or northwesterly winds predominated. In the Pacific States, except in the Sacramento valley, the direction is westerly.

Total Movements of the Air.—The following were the *largest* monthly movements in miles, recorded at the Signal Corps stations: Cape Lookout 11,258 miles; Portsmouth, N. C., 11,198; Kittyhawk, 10,430; Cape May, 9,063; Sandusky, 8,879; Cape Hatteras, 8,819; Sandy Hook, 8,574; Milwaukee, 8,401; Breckenridge, 8,248; Barnegat, 8,207; Indianola, 8,090; Stockton, 7,910; North Platte, 7,863. The *smallest* movements were: Laredo, Tex., 1,500; Visalia, Cal., 1,707; Nashville, 1,745; Deadwood, 1,754; Tuscon, Ariz., 2,844; Lynchburg, Va. and Fredericksburg, Tex., 1,968; Uvalde, Tex., 2,037; Indianapolis, 2,314; Shreveport, 2,358; San Antonio, Tex., 2,389; Graham, Tex., 2,390.

Local Storms.—At Sandy Springs, Md., on the 3rd "a tornado occurred shortly before 6 p. m., after a light shower of rain—sun shining at the time; a dark cloud was first noticed coming from the SSW., shaped like a funnel, and of a color which varied from copper and reddish to black, whirling with great rapidity and advancing at the rate of 15 to 20 miles per hour. At frequent intervals a column appeared to rise from the earth, at first white like steam, but on connecting with the funnel exhibited many hues, as if illuminated in the interior by electricity. The noise as the tornado advanced was compared to that of an immense fire, or heavy freight trains passing over a bridge. The damage was confined to the distruction of trees, fences, &c., for a length of about six miles and from thirty to one hundred yards in width. Large trees were snapped and twisted off or torn up by the roots and the branches whirled 600 feet into the air and scattered over neighboring fields. The oldest inhabitant of this vicinity can recall no parallel." At Gettysburg, Pa., on the 4th, "a tornado demolishing a church and unroofing other buildings; path of storm, about 60 feet wide and extending in an irregular direction from south to north; cloud funnel-shaped." On the night of the 7th a severe thunder-storm passed over New Jersey, traveling in a general direction toward the northeast; in Morris County, glass was broken, corn and buckwheat crops damaged, several barns struck by lightning and burned.

Sand Storms occurred at Fort Garland, Col., 11th; Las Cruces, New Mex., 17th; Yuma and Phœnix, Arizona, 26th; Burkes, Arizona, 24th.

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily weather indications for September with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of omissions to be 0.62 per cent, and of verifications to be 89.3 per cent. The percentages for the four elements have been, Weather, 92.6; Direction of the Wind, 90.6; Temperature, 88.0; Barometer, 85.6. The percentages of verifications by geographical districts, have been: New England, 87.7; Middle States. 90.3; South Atlantic States, 88.8; Eastern Gulf States, 89.2; Western Gulf States, 88.9; Lower Lake region, 88.3; Upper Lake region, 90.8; Tennessee and the Ohio valley, 89.9; Upper Mississippi valley, 89.8; Lower Missouri valley, 87.5; Northern Pacific coast region, 89.3; Central Pacific coast region, 100.0; Southern Pacific coast region, 100.0. Of the 3,667 predictions that have been made, 82, or 2.24 per cent, are considered to have entirely failed; 76, or 2.07 per cent, were one-fourth verified; 325, or 8.86 per cent. were one-half verified; 366, or 9.98 per cent, were three-fourths verified; 2,818, or 76.85 per cent, were fully verified, so far as can be judged from the tri-daily weather maps.

Cautionary Signals.—170 Cautionary Signals were displayed during the month, of which 117, or 68.8 per cent., were justified by winds of 25 miles per hour or over at, or within a radius of 100 miles of, the station. 29 Cautionary Off-shore Signals were displayed, of which 1 was not justified either as to direction or velocity; 28, or 96.5 per cent., were justified as to direction, of which 19, or 65.5 per cent., were justified also as to velocity. Of the Cautionary Off-Shore Signals, 16 were changed from Cautionary. 181 Signals of both kinds were displayed, of which 119, or 65.7 per cent., were fully justified. The above does not include signals ordered at 52 display stations where the velocity is only estimated. 35 cases were reported of winds of 25 miles or over where signals were not ordered.

NAVIGATION.

In the table on the right-hand side of Chart No. III. are given the highest and lowest readings on the Signal Service river-gauges for the month, with the dates. From this table it will be seen that the rivers have continued very low and generally falling throughout the entire month. The highest readings, with four exceptions, occurred during the first half, and the lowest readings, with only one exception, (New Orleans,) from the 26th to the 30th. The total monthly range at the Signal Service stations has averaged about two feet in the Red, Arkansas, Missouri, upper Mississippi, upper Ohio and Tennessee rivers. In the lower Ohio, at Cincinnati, thirteen, at Louisville seven and Cairo fifteen; in the Cumberland and at Nashville nine, and in the lower Mississippi at Memphis ten and at Vicksburg eleven feet. The low stage of water has caused a entire suspension of navigation in many of the navigable streams. On the 29th navigation was completely suspended on the Tennessee at Chattanooga, where the water was lower than since 1839. At Pittsburgh one-half the bed of the Monongahela was perfectly dry on the 30th, and the Alleghany was so low as to threaten the cities along its banks with a great scarcity of water.

High Tides.—Atlantic City, 22nd; Cape Lookout, 18th, very heavy NE. swell and full tide; 25th, p. m., very high; Indianola, 22nd and 24th very high, 30th flooding streets.

TEMPERATURE OF WATER.

The *temperatures of water*, as observed in rivers and harbors, with average depth at which the observations were taken, are given on chart No. II. At the following stations, on account of breakage of thermometer, no observations were made on the dates indicated:—Augusta, from the 11th to 23rd; at Portland, Me., 11th to 25th, and at San Francisco, 11th to 25th, all inclusive.

ATMOSPHERIC ELECTRICITY.

Thunderstorms occurred on the following days: In New England, 2nd, 3rd, 4th, 7th, 8th, 10th, 11th, 14th, 17th, 19th, 24th and 28th. Middle States, 2nd, 3rd, 5th, 7th, 8th, 13th, 14th, 16th, 17th, 24th and 28th. North Carolina, 8th, 19th. Florida, 2nd, 3rd, 5th, 7th, 9th, 11th, 16th, 17th 18th, 21st, 22nd, 23rd, 24th and 29th. Alabama, 1st. Mississippi, 1st, 2nd, 12th and 15th. Arkansas, 12th. Texas, 8th, 9th, 10th, 11th, 19th, 20th, 24th and 30th. Ohio valley and Tennessee, 1st, 4th, 7th, 8th, 12th, 13th, 14th, 27th and 28th. Upper Lakes, 1st, 2nd, 3rd, 4th, 7th, 11th, 12th, 13th, 15th, 16th, 18th, 23rd, 26th, 27th, and 28th. Upper Mississippi valley, 1st, 5th, 6th, 7th, 9th to 15th, 18th, 21st, 22nd, 23rd, 26th to 30th. Lower Missouri valley, 5th to 13th, 20th, 21st, 23rd, 27th, 28th, 29th and 30th. Northwest, 27th and 28th. Colorado, 3rd and 18th. New Mexico, 4th, 17th, 18th, 27th, 29th. Idaho, 25th. Oregon, 8th. Lightning was observed at Calistoga and Princeton, Cal., on the 24th.

Auroras.—From the 9th to the 11th an extensive aurora was observed in all the states from New England to Dakota. Auroras were also observed on the dates named at scattered stations over the same tract of country as follows. On the first at Starkey, N. Y.; 12th, Eastport and Bangor, Me., Breckenridge; 15th, Vevay, Ind. and Monticello, Ia.; Eastport and Bangor, Me.; 17th, Starkey, N.Y.; 18th, New Corydon, Ind.; 19th, Wellsboro, Pa., Pembina; 20th, New Corydon, Ind., Eastport; 21st, Pembina, Burlington, Vt.; 22nd, Eastport; 23rd, Starkey, N. Y.; 24th, Springfield, Mass., Woodstock, Vt.; 25th, Fall River, Mass., Starkey, N. Y., Woodstock, Vt.

Atmospheric Electricity Interfering with Telegraphic Communication.—At Santa Fé, on the 4th, 5th, and 9th; Pilot Point, Texas, 5th; Mason, Texas, 11th; Jacksboro, Texas, 5th; Castroville, Texas, 8th and 9th; Eagle Pass, Texas, 20th; Socorro, N. M., 4th.

OPTICAL PHENOMENA.

Solar Halos were observed on the following dates in the different districts: New England, 1st, 21st, 24th, 25th, and 29th; Middle Atlantic States, 1st, 2nd, 3rd, 7th, 21st, 23rd, 25th, 28th, 29th, and 30th; Florida, 18th and 20th; Western Gulf States, 10th, 14th, 24th, 28th and 29th; Ohio valley, 7th, 9th, 12th, 13th, 15th, 19th, 27th, 28th, 29th and 30th; Michigan, 17th and 22nd; Upper Mississippi valley, 4th, 5th, 10th, 11th, 14th, 15th, 28th and 29th; Lower Missouri valley, 8th, 12th, 14th, 15th, 18th, 24th and 27th; Northwest, 3rd, 4th, 9th and 28th; Utah, 7th, 8th and 26th; California, 25th and 27th; Oregon, 1st.

Lunar Halos were observed on the following dates in the different districts: New England, 1st, 2nd, 23rd, 24th to 30th; Middle States, 1st, 2nd, 12th, 22nd, 23rd, 25th, 28th to 30th; South Atlantic States, 2nd, 3rd, 22nd to 29th; Gulf States, 2nd, 22nd. 23rd, 24th, 27th to 30th; Ohio valley and Tennessee, 10th, 24th, 26th to 30th; Lower Lakes, 1st, 2nd, 12th, 25th, 27th, 28th; Upper Lakes, 11th, 24th, 28th, 29th; Upper Mississippi valley, 1st, 2nd, 5th, 15th, 23rd, 26th to 30th; Lower Missouri valley, 26th to 30th; Northwest, 7th; Utah, 22nd 25th, 26th; Nevada, 29th; California, 25th; Oregon, 28th.

MISCELLANEOUS PHENOMENA.

Prairie and Forest Fires.—Ft. Sill, 2nd, 7th, 8th, 9th, 10th, 15th, 20th, 27th; Bismarck, 2nd, 25th; Pembina, 29th, 30th; Ft. Gibson, 7th, 8th, 9th, 17th, 23rd, 26th, 30th; Cheyenne, 7th, 8th; Colorado Springs, Col., 13th, in mountains; Pike's Peak, 5th, in mountains; Santa Fé, 12th, 13th, 15th, 16th, 17th, 18th, in mountains; Salt Lake City, 16th, in mountains; Burlington, Vt., 1st, 2nd, in mountains; Hermosa, Col., 15th, 16th, 17th, 18th; Morristown, Dak., 21st; Los Angeles, Cal., 12th, 13th, 14th and 15th, in mountains, destroying large tracks of timber; Ft. Stevenson, Dak., 25th and 26th; Breckenridge, 8th; Ft. Garland, Col, 8th and 9th, on mountains; Boise City, 13th, in mountains; Creswell, Kans., 14th, 15th, 16th; Clear Creek, Neb. 7th.

Mirage.—New Haven, Conn., 12th.

Meteors.—On the 5th, a very brilliant meteor was observed in Nevada and Utah, of which the following reports are to hand: Salt Lake City, 7:10 p. m., brilliant meteor appeared a few degrees south of west, and shot across the sky in a northwesterly direction, leaving behind it a bright silvery streak 7° in length, and resembling a cloud. One striking peculiarity of this streak, was it resemblance to certain letters of the alphabet, two W's being plainly visible and followed by a succession of N's. It disappeared at 7:25 p. m., having at that time, a pinkish color, the sky, during the whole time, being perfectly clear. The meteor did not appear much larger than an ordinary star. Pioche, Nevada, 6.40 p. m., brilliant meteor, at from 35° to 40° above the western horizon. Motion, at first, from east to west, when it turned rapidly to the northwest and with a hissing noise, fell to the earth, about 40 miles from the station. It left a train, which was visible for 45 minutes; sky perfectly clear. Deep Creek, Utah, 7:30 p. m., brilliant meteor, passing from SE. to SW., leaving a silver streak in its wake, lasting fully twenty minutes. It was also observed at Austin, Nev. At Chattanooga, on the 15th, 11 p. m., a very bright meteor, passing from zenith to NW. horizon, leaving in its wake a pale yellow cloud.

Sunsets.—The characteristics of the sky at sunset, as indicative of fair or foul weather, for the succeeding twenty-four hours, have been observed at all Signal Corps stations. Reports from 140 stations show 4,195 observations to have been made, of which 30 were reported doubtful; of the remainder 3,575 or 85.2 per cent were followed by the expected weather.

Zodiacal Light.—New Corydon, Ind., 17th, 19th, 21st, 25th, 26th; Palermo, N. Y., 16th, 20th; Fayetteville, N. C., 15th; Lynchburg, Va., 5th, 15th.

Earthquakes.—At Memphis, Tenn., on the 25th, at 9.10 p. m. a very perceptible shock; duration, six seconds; direction, from NW. to SE.

Polar Bands.—New Corydon, Ind., 6th, 7th, 11th, 19th, 29th; Guttenburg, Ia., 19th; Tabor, Ia., 15th; Waterburg, N. Y., 10th, 11th; Portland, Or., 20th; Clear Creek, Neb., 18th and 19th.

Sun Spots.—The following record of observations, made by D. P. Todd, Assistant, has been forwarded by Prof. S. Newcomb, U. S. Navy, Superintendent Nautical Almanac, Washington, D. C.:

Date—Sept., 1879.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Remarks.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots.	
1st, 5 p. m...	0	0	0	0	0	0	1	3	
3rd, 3 p. m...	0	0	0	0	0	0	1	1	
4th, 4 p. m...	0	0	0	0	0	0	1	1	
5th, 3 p. m...	0	0	0	0	0	0	1	1	Faculæ.
6th, 3 p. m...	0	0	0	0	0	0	1	1	Faculæ.
7th, 5 p. m...	0	0	1	1	0	0	0	0	
8th, 4 p. m...	0	0	0	0	0	0	0	0	Faculæ.
9th, 3 p. m...	0	0	0	0	0	0	0	0	Faculæ.
16th, 3 p. m	1	3	0	0	0	0	1	3	
17th, 4 p. m...	0	0	1	3	0	0	0	0	Faculæ.
17th, 5 p. m...	0	0	0	0	0	0	0	0	Faculæ.
24th, 3 p. m...	1	1	0	0	0	0	1	1	Faculæ.
25th, 3 p. m...	0	0	0	0	0	0	1	1	Faculæ.
26th, 3 p. m...	0	0	0	0	0	0	1	1	Faculæ.
26th, 4 p. m...	0	0	0	0	0	0	1	1	Faculæ.
27th, 3 p. m...	0	1	0	0	0	0	1	2	
29th, 4 p. m...	0	0	0	0	0	0	1	2	
30th, 1 p. m...	0	0	0	0	0	0	1	2	
30th, 3 p. m...	0	0	0	0	0	0	1	2	

Observations were also made on the 10th, 12th, 18th and 23rd at 3 p. m., on the 11th at 9 a. m. and 4 p. m. and on the 15th, 19th and 22nd at 4 p. m., but no spots seen at these hours. Mr. David Trowbridge at Waterburg, N. Y., examined the sun on the 8th, 10th, 11th, 12th, 14th, 16th, 17th, 19th, 20th, 21st, 22nd, 23rd, 30th, but observed no spots. On the 1st, 4th, 5th, 6th, 7th, 25th, 26th 27th, "spots re-appeared by solar rotation." Mr. H. D. Gowey at North Lewesburg, Ohio, reported as follows: 4th, 7:30 a. m. one spot; never observed a spot as far north of the sun's equator before. Observations were also made at Ft. Whipple throughout the month, but no spots seen.

Locusts.—Genoa, Neb., 1st, 7th and 12th, flying southeast; Fort Sill, I. T., 11th, moving south in great swarms, very few alighted; Leavenworth, Kansas, 12th, p. m. large numbers observed flying too high to distinguish direction, very few alighted; Weatherford, Texas, 23rd, large numbers have disappeared in the Keachi valley to the southward; Jacksboro, Texas, 13th, 14th and 15th, in large numbers, doing great damage to cotton plants, 16th, disappeared; Henrietta, Texas, 10th and 15th, large numbers passed over station, from northwest to southeast, no damage done; Graham, Texas, 14th, vast numbers seen moving to the southward; Creswell, Kansas, 1st, 2nd and 3rd, flying south, very few alighting. 7th, southwest, 12th and 13th, south; Clear Creek, Neb., 2nd, flying south; Walla Walla, W. T., 3rd, very large numbers flying high in the air, very few alighting; for the past two weeks they have been appearing in variable numbers.

Geese.—Princeton, Cal., 14th, first appearance; Genoa, Neb., 23rd, flying south; Pembina, 14th, flying north; Keokuk, 13th, flying south; Creswell, Kan., 14th, flying south; Clear Creek, Neb., south, 16th, 20th, 23rd.

NOTES AND EXTRACTS.

[From London *Quarterly Journal*, January, 1879.]

"*Meteorology of Bangkok, Siam.*—By J. CAMPBELL, Staff Surgeon R. N.—The following observations were made at Bangkok, the Capital of Siam, during the years 1858-1868, omitting 1862. A glance at a map of Indo-China will show that that kingdom, Muang Thai, the Land of the Free, has a geographical position such as to preserve it from the heat, deluges of rain and devasting cyclones so common to adjoining countries; the elevated land of the Malayan Peninsula, Burmah and the Gulf of Siam, contributing largely to an anomalous state of things, and which meteorologically considered will be apparent in the tables herein given.

"The instruments employed were partly private during the first four years, but they were compared at Kew with standards. The last six years' records were entirely from those supplied by the Meteorological Department of the Board of Trade. The rain-guage during the first four years was of my own construction. Up to April, 1859, the barometer was a mercurial one—Government—but it got out of order, and till 1863 I depended on an aneroid. This instrument evidently deteriorated yearly, though slightly. It is, however, evident that the first two instruments were originally at a less height than the barometer of the last six years. Up to May, 1859 the instruments were placed in the north verandah of a floating house, 7 ft. above tidal influence, the rain-gauge 20 ft. above the river, so as to be higher than the houses and completely secluded from the sun; after the above date they were placed, for a time, in a large airy room of my house on land, and subsequently in its north verandah, at an elevation of 21 ft. above high water level. The rain-gauge was at an elevation of about 45 ft., but for the last two years it was only 3 ft. above high water. These changes of elevation ought, theoretically considered, to have a disturbing influence on the regularity of the items recorded, excepting the barometer; but such does not appear to have ensued to any appreciable extent.

"*Barometer.*—The pressure of the atmosphere attains its maximum in December, sometimes in January, and then falls till June, July or August, when its maximum is reached: these are uninfluenced by any local causes, an unusual inundation, much rain, drought or heat having no observable effect upon the height of the mercurial column of its daily tides, which takes place about 3½ a. m. and p. m. for minima, and 9½ a. m. and p. m. maxima. The range is about 0·110 in., but occasionally it amounts to 0·180 in.

"*Temperature.*—The lowest temperature of the year occurs in December, though sometimes it may be in November, January or February, and the highest usually takes place in April, but it may be noticed in the preceding or subsequent month. In this record the minimum, 57°, took place in December, and the maximum, 97°.5, in May. The monthly means make the extremes in December and April. The *Tension of Vapor* follows a similar rule, viz. the lowest in December and highest in May, but the tables of *Humidity* and *Rain-fall* are different; these agree in making December the minimum and September the maximum of the year. The years 1859 and 1864 were remarkable for little rain, years of drought, in 1865 rice was imported, whilst 1860 and 1868 were the years of greatest rain-fall.

"*Hail* occurred only once, one afternoon, during my residence of fifteen years.

"*Winds.*—In September the SW. monsoon becomes weak; early in October N. breezes set in, varying from W. to E. by the northern segment, and during this month or November the NE. monsoon is quite established. Throughout December it continues strong, but in January it has lost half of its last month's vigour, and in February retains only a fifth of its original force; the deficiency being in part made up by an increase of wind varying from SSE. to SW. By the end of the month or early in March the N. winds have ceased and strong breezes from S. and SSW. prevail, locally termed the Kite and Junk winds. It is in April that the greatest heat takes place, and for two or three nights in succession, if no breeze stirs the air, the plight of foreigners, ay even of natives, is not to be envied. During the months of May, June, July and August, the SW. winds are strong and constant, sometimes boisterous, the direction being chiefly S. and SSW. till June, snd thence SW. to September, when light variable winds are the rule, and foretell a breaking up of the SW. monsoon."

[From *Nature*, August 7th, 1879.]

"On the morning of Sunday, August 3d, a little before two o'clock a. m., the Royal Gardens at Kew were devastated by a hailstorm, which in the space of about ten minutes inflicted more damage than the Gardens have sustained since their existence as a national institution. After a rapid survey of the houses the following day, it was found that the number of broken squares of glass could not be estimated at less than 16.000. In the great temperate house alone 3,000 squares were shattered. The storm, which was accompanied by violent thunder and lightning, drove over the garden from the northeast, and expended its greatest fury in the direction of Richmond. The temperate house suffered the full effects while the palm house being apparently a little to the west of its course, escaped with the destruction of 700 panes. The hailstones were found to average one-and-a-half inches in diameter, and to weigh three-quarters of an ounce. They came down with sufficient force to bury themselves in the bare earth of the flower borders, and even penetrate the turf to the depth of an inch. In some cases perfectly circular holes were cut out of the glass panes, while the hailstones went through the succulent leaves of the Echeverirs planted out in the beds with as clean an outline as if it had been made with a punch. On account of the confusion produced by the damage and the danger from falling splinters of glass, it has been necessary to close all the houses to the public. The present night-temperature, and the probability of heavy showers, are grounds for the gravest anxiety as to the preservation of the collections which, however, speedy the repairs to the houses, cannot fail to suffer considerable injury. The damage is estimated at not less than 2,000*l*., as many of the houses being a great deal dilapidated, cannot be put in order without entire re-glazing, repainting, and partial renewal, and application will have to be made to Parliament for a supplimentary vote to defray the cost."

"On August 30th M. Gaston Tissandier made an ascent from La Villette Gas Works with his wife and his brother. The travellers started at 5h. and landed at 7h. 50 at Dawmartin. The observations were highly interesting. When the *National* left ground, the wind was blowing southwesterly, but at about 7h. the direction changed abruptly, and an instantaneous change took place in the direction of the balloon It was caused by the *brise de mer* setting in after a hot day. The sky was covered with cumulus, intermixed with a few cirrus of small dimensions. When at an altitude of 600 metres, M. Tissandier passed through a cloud which was very cold indeed, as proved by the sensation which the travellers experienced, but the duration of the passage was so short that it was not possible to observe the temperature at the thermometer. When at a higher altitude M. Tissandier observed the refraction of the rays of the sun on icy particles, and at the same moment on the western sky splendid rainbows. At the same time a very large halo had been observed at Paris by the *Temps* meteorological editor, and noted by him."

"Dr. Dunant publishes in the *Journal de Geneve* a note on the low temperature of this summer. While the mean temperature for the years 1873 to 1878 was 18°.9 Celsius in June, and 21°.0 during the first half of July, in 1879 is was only 18.°8 and 16°.7."

"A shock of earthquake was felt on July 20th, 3.30 a. m. at Vulpera, in the Engadine (Switzerland. It was accompanied by a rather strong rumbling."

An earthquake consisting of three moderately violent shocks is reported from Cairo. The phenomenon was observed in the night of July 11-12. In the quarter of Bab-en-Nasr, which is at some distance from the modern portion of the city, some isolated walls fell in, and an old and somewhat dilapated minaret has suffered so severely that it must be taken down. During the last decades earthquakes have been extremely rare at Cairo and indeed in Egypt generally, and since the great earthquake of 1857, which caused so much damage amongst the shaky old buildings, in which the Caliph-city abounds, and though several lives were lost, no earthquake of importance has occurred. The phenomena of July 11-12 is said to have been noticed also at Gizeh, near the great pyramids."

The Manila papers state that a terrible thunderstorm passed over that city on May 31st. It was preceded by an almost suffocating warm atmosphere and rain, and lasted about an hour. The lightning struck the Binondo Tower, damaging the crystal shade of the clock, but not injuring the mechanism, though the stone work forming the arch was much damaged. Out of several persons in the tower at the time, four appear to have been killed. Several other places in the city were more or less injured."

"*Comptes Rendus hebdomaires des séances de l'Académie des Sciences. Tome* 89, *Page* 382:"—"The month of July 1878 was one of the coldest ever experienced at Paris. At the 'Parc de Saint Maur,' where hourly observations are made, except at 2 and 3 a. m., we have found as a mean of the daily extremes 16°.18, and for the mean of 24 hours 15°.59. The maximum temperature 28°, occurred on the 30th."

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

Brig. Gen. (Bvt. Assg^{d}.) Chief Signal Officer, U. S. A.

Copy furnished for

WAR DEPARTMENT W
SIGNAL SERVICE, U.S.
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEF
TRACKS OF CENTRES OF AREAS OF LOW BA
IV
VI
VII
III
II
I
San Francisco
San Diego
Galveston
Indianola
AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 109TH MERIDIAN.
No. | Velocity.
I. 16 miles per hour.
II. 19 do.
III. 20 do.
IV. 17 do.
V. 28 do.
VI. 24 do.
VII. 24 do.
PUBLISHED BY ORDER
BRIG. GEN., (DVT. ASS'T

No. I.

NT WEATHER MAP.
VICE, U.S.ARMY.
HE BENEFIT OF COMMERCE AND AGRICULTURE.
LOW BAROMETER FOR SEPTEMBER, 1879.
VI
VII
III
IV
I
II
Halifax
Portland
New London
Cape May
Norfolk
Kittyhawk
Cape Hatteras
Wilmington
Charleston
Savannah
Jacksonville
Punta Rassa
Key West
Havana
NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7:35 A. M., the 4:35 P. M., and 11 P. M., (Washington mean time,) observations. The small circles on the lines indicate the position of the centers of the areas of low barometer for the day and observation respectively above and below the line.
97° Long. West from 82° Greenwich

D BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BVT. MAJ. GEN'L, CHIEF SIGNAL OFFICER, U. S. A.

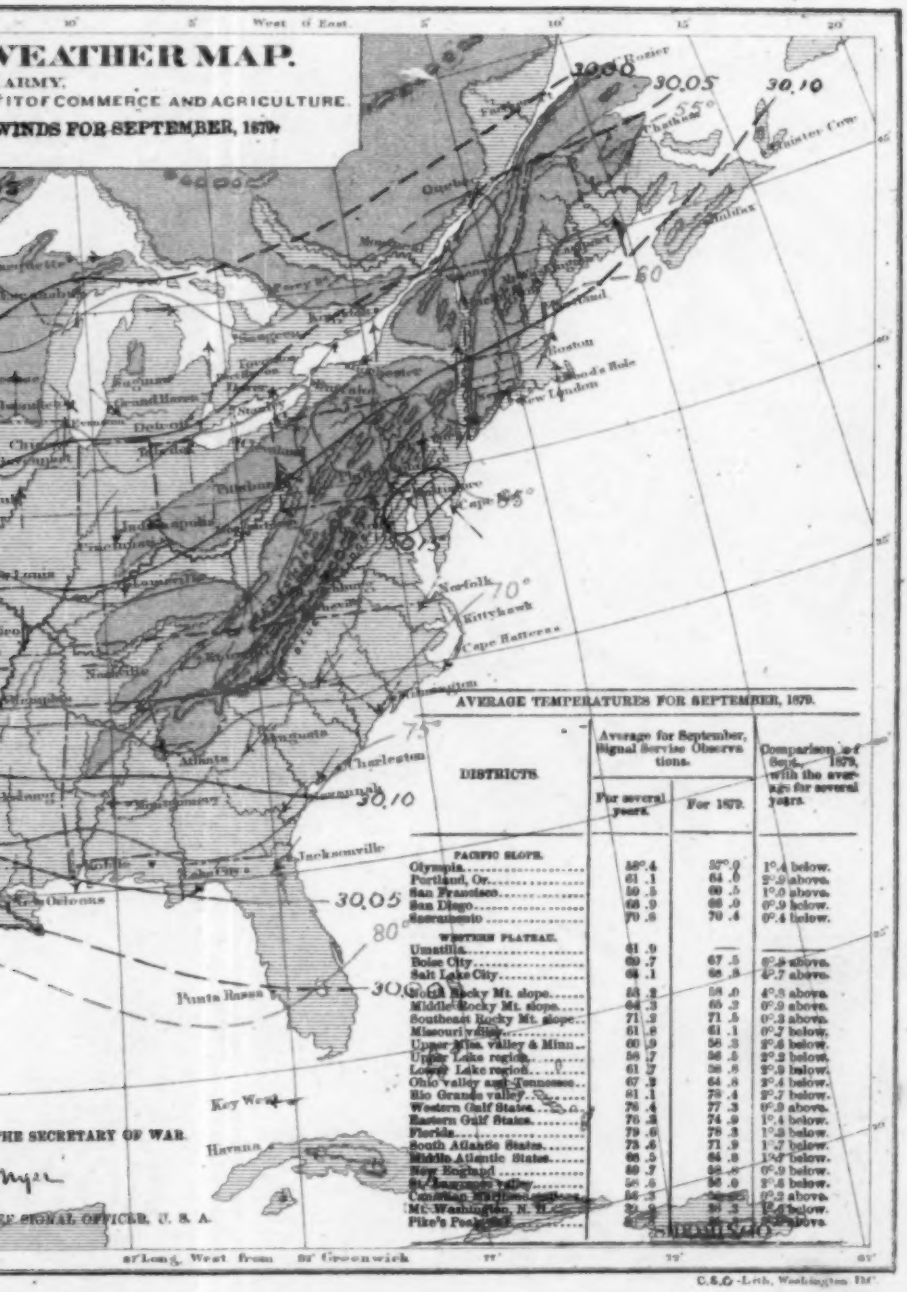
C.S.O. -Lith. Washington, D.C.

WAR DEPARTMENT WEAT
SIGNAL SERVICE, U.S. ARMY.
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COM
ISOBARS, ISOTHERMS AND PREVAILING WINDS FO
PUBLISHED BY ORDER OF THE SECRET
Albert J. Myer
BRIG. GEN., (BVT. ASSO'D,) CHIEF SIGNAL

TEMPERATURE OF WATER ... SEPTEMBER, 187...

STATIONS.	Temperature at bottom.		Average depth of water, in
	Max.	Min.	
Alpena	60	54	13
*Augusta	81	72	5
Baltimore	78	63	8
Buffalo	72	61	13.5
Burlington, Vt.	68	58	1
Charleston	81	68	6.5
Chicago	72	60	6
Cleveland	74	62	14
Detroit	74	58	27
Duluth	63	54	10.5
Eastport	58	49	19.4
Escanaba	63	54	13
Galveston	84.5	73.5	13.5
Grand Haven	68	56	19
Jacksonville	83	70	12
Key West	87	83	17.4
Marquette	69	54	10.4
Milwaukee	66	48.5	15
Mobile	85	75	13.4
New London	67	60	13.5
New York	72	61	15.5
Norfolk	80	66	22
*Portland, Maine	61	54	20
Punta Rassa	89	80	12
Sandusky	74	66	10
St. Marks	79	70	18
*San Francisco	61	56	25
Savannah	89	79	11.4
Toledo	74	67	9.5
Wilmington	85	68	17
Wood's Holl	71	60	9

* Observations for only part of month.—See text.



AVERAGE TEMPERATURES FOR SEPTEMBER, 1879.

DISTRICTS.	Average for September, Signal Service Observations.		Comparison of Sept., 1879, with the averages for several years.
	For several years.	For 1879.	
PACIFIC SLOPE.			
Olympia	58°.4	57°.9	1°.4 below.
Portland, Or.	61 .1	64 .0	2°.8 above.
San Francisco	59 .5	60 .5	1°.0 above.
San Diego	66 .9	66 .0	0°.9 below.
Sacramento	70 .8	70 .4	0°.4 below.
WESTERN PLATEAU.			
Umatilla	61 .9		
Boise City	69 .7	67 .5	2°.2 above.
Salt Lake City	64 .1	68 .8	4°.7 above.
Middle Rocky Mt. slope	63 .2	68 .0	4°.8 above.
Southeast Rocky Mt. slope	71 .3	71 .5	0°.2 above.
Missouri valley	61 .8	61 .1	0°.7 below.
Upper Miss. valley & Minn.	60 .9	58 .3	2°.6 below.
Upper Lake region	58 .7	56 .5	2°.2 below.
Lower Lake region	61 .7	59 .8	2°.9 below.
Ohio valley and Tennessee	67 .3	64 .8	2°.4 below.
Rio Grande valley	81 .1	78 .4	2°.7 below.
Western Gulf States	76 .4	77 .3	0°.9 above.
Eastern Gulf States	76 .3	74 .9	1°.4 below.
Florida	79 .6	78 .3	1°.3 below.
South Atlantic States	75 .6	71 .9	3°.7 below.
Middle Atlantic States	66 .5	64 .8	1°.7 below.
New England	60 .7	59 .8	0°.9 below.
St. Lawrence valley	58 .6	56 .6	2°.0 below.
Canadian Maritime [illegible]	56 .3	[illegible]	0°.2 above.
Mt. Washington, N. H.	32 .9	30 .3	2°.6 below.
Pike's Peak, Col.	37 .9	38 .3	0°.4 above.

THE SECRETARY OF WAR.

E SIGNAL OFFICER, U. S. A.

C.S.O.-Lith, Washington D.C.

AVERAGE PRECIPITATION FOR SEPTEMBER.

DISTRICTS.	Average for September. For many years.	Average for September. For 1879.	Comparison of September, 1879, with the average for many years.
	Inches.	Inches.	Inches.
St. Lawrence Valley	3.19	3.53	0.34 above.
New England	3.90	3.45	0.45 below.
Middle Atlantic States	3.30	2.36	1.94 below.
South Atlantic States	3.15	3.41	0.26 above.
Eastern Gulf States	4.68	5.44	1.76 above.
Western Gulf States	5.09	3.10	1.99 below.
Tennessee	3.15	2.01	1.14 below.
Ohio Valley	2.86	3.34	0.48 above.
Lower Lake Region	3.40	3.52	0.12 above.
Upper Lake Region	3.65	4.14	0.49 above.
Upper Mississippi Valley	3.85	2.47	1.38 below.
Minnesota	2.15	2.76	0.61 above.
Lower Missouri Valley	3.25	2.06	1.19 below.
Upper Missouri Valley	2.69	1.45	1.24 below.
California Coast	0.09	0.09	0.00 below.
Portland, Or	0.91	3.18	1.27 above.

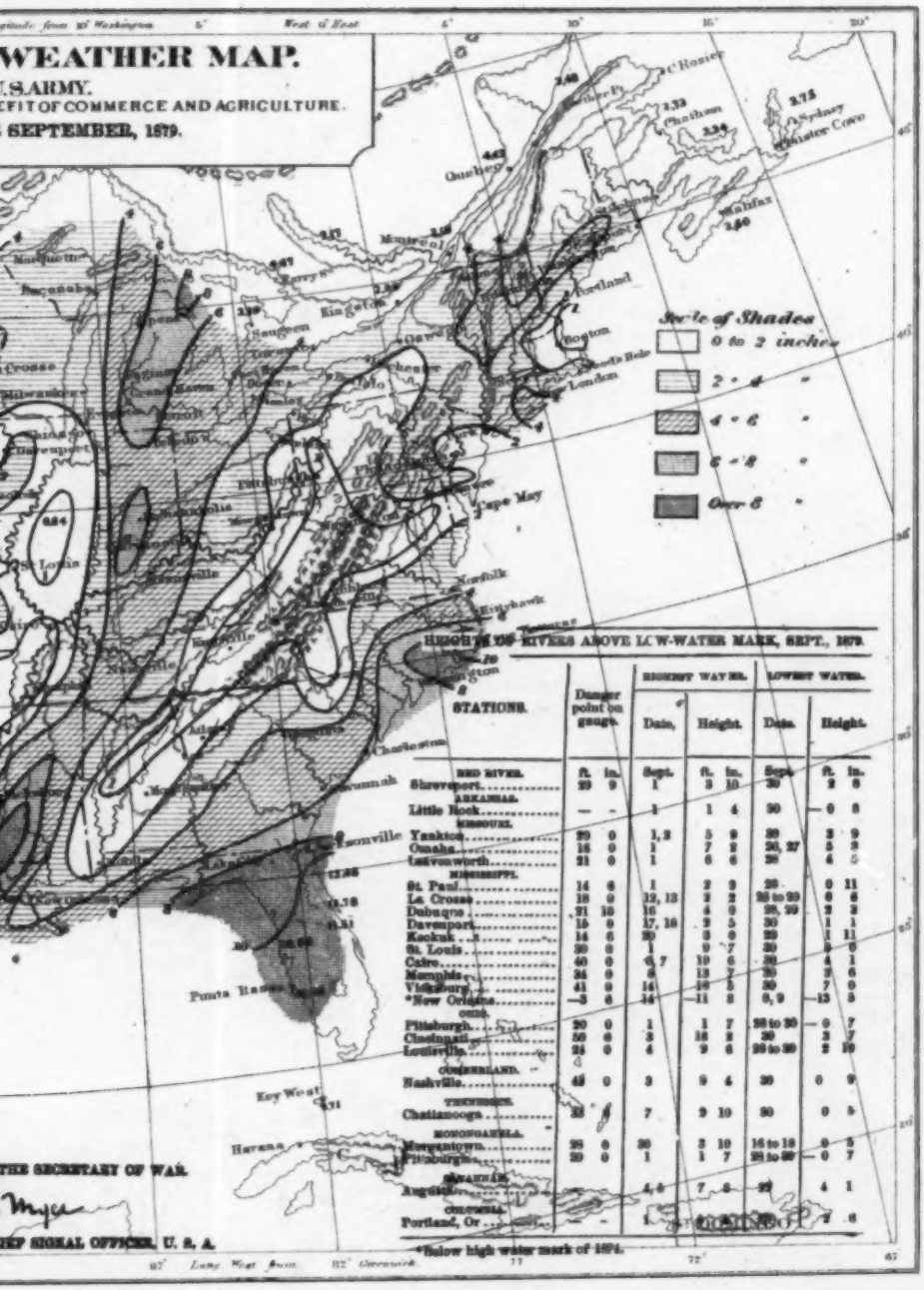
No. III.

WEATHER MAP.

U.S. ARMY.

EFIT OF COMMERCE AND AGRICULTURE.

SEPTEMBER, 1879.



HEIGHT OF RIVERS ABOVE LOW-WATER MARK, SEPT., 1879.

STATIONS.	Danger point on gauge.		HIGHEST WATER.			LOWEST WATER.		
			Date.	Height.		Date.	Height.	
RED RIVER.	ft.	in.	Sept.	ft.	in.	Sept.	ft.	in.
Shreveport	29	0	1	3	10	30	2	6
ARKANSAS.								
Little Rock	—	-	1	1	4	30	— 0	8
MISSOURI.								
Yankton	20	0	1, 2	5	9	29	3	9
Omaha	16	0	1	7	2	26, 27	5	2
Leavenworth	21	0	1	6	6	28	4	5
MISSISSIPPI.								
St. Paul	14	0	1	2	3	29	0	11
La Crosse	18	0	12, 13	3	2	23 to 29	0	8
Dubuque	21	10	10	4	9	28, 29	2	3
Davenport	15	0	17, 18	2	5	30	1	1
Keokuk	14	6	20	3	0	29	1	11
St. Louis	30	0	1	0	7	30	5	0
Cairo	40	0	6, 7	10	6	22	4	1
Memphis	34	0	6	13	7	30	7	6
Vicksburg	41	0	14	10	5	30	7	0
*New Orleans	—5	6	14	—11	8	6, 9	—15	8
OHIO.								
Pittsburgh	20	0	1	1	7	23 to 30	— 0	7
Cincinnati	50	0	3	16	8	29	2	7
Louisville	24	0	4	9	6	28 to 30	2	10
CUMBERLAND.								
Nashville	45	0	3	9	4	30	0	9
TENNESSEE.								
Chattanooga	33	0	7	9	10	30	0	5
MONONGAHELA.								
Morgantown	25	0	30	3	10	16 to 19	— 0	5
Pittsburgh	20	0	1	1	7	23 to 30	— 0	7
SHAWANEE.								
Augusta	—	-	4, 5	7	6	27	4	1
COLUMBIA.								
Portland, Or	—	-	1	[illegible]		[illegible]	7	6

*Below high water mark of 1874.

THE SECRETARY OF WAR.

EP SIGNAL OFFICER, U. S. A.

WINDS ACCOMPANYING THE ATLANTIC STORMS.

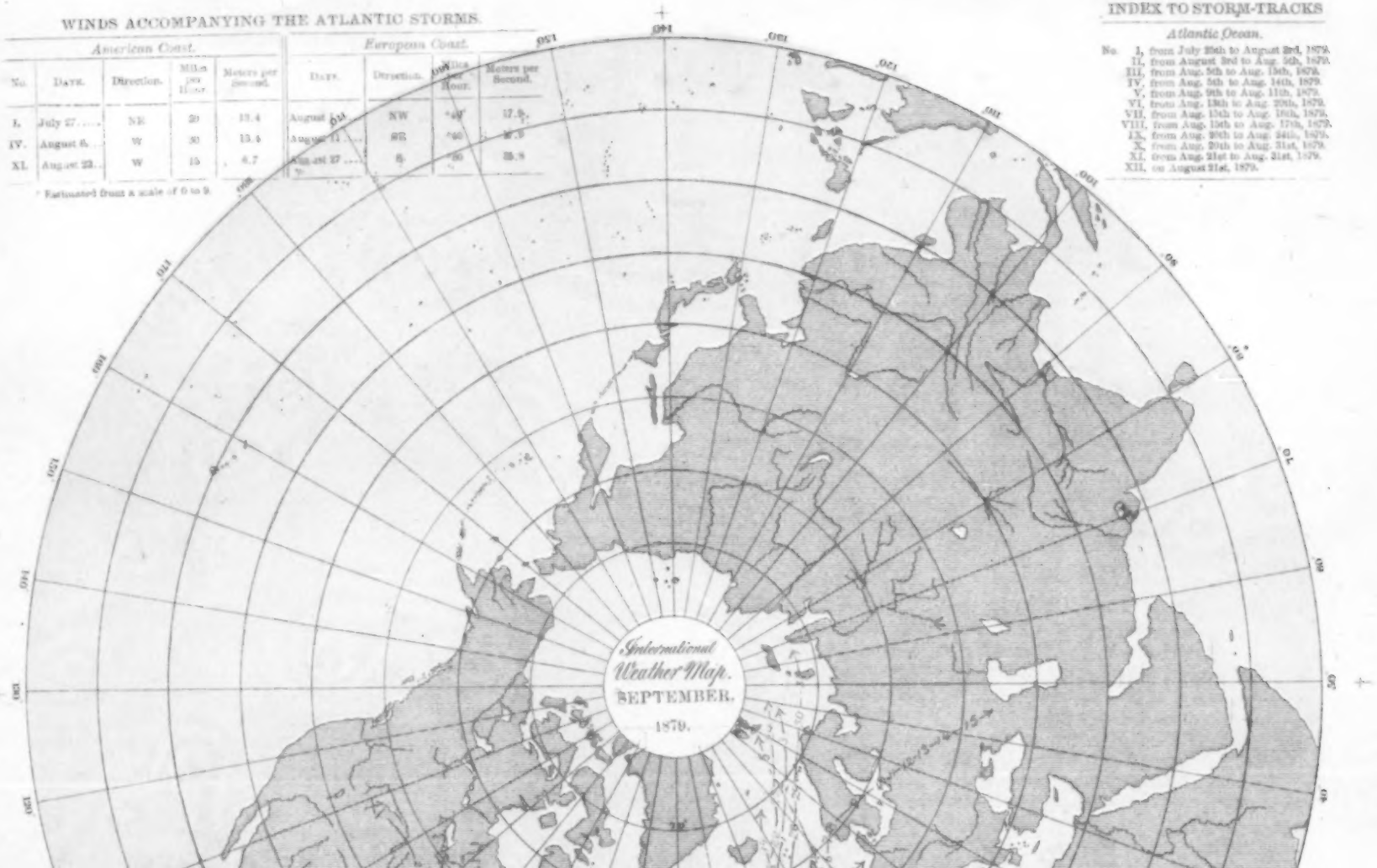
	American Coast.				European Coast.			
No.	Date.	Direction.	Miles per Hour.	Meters per second.	Date.	Direction.	Miles per Hour.	Meters per Second.
I.	July 27.....	NE	29	13.4	August 1	NW	*40	17.9
IV.	August 6....	W	30	13.4	August 11	SE	*60	26.9
XI.	August 22...	W	15	6.7	August 27	S	*80	35.8

* Estimated from a scale of 0 to 9.

INDEX TO STORM-TRACKS

Atlantic Ocean.

No. I, from July 26th to August 3rd, 1879.
II, from August 3rd to Aug. 5th, 1879.
III, from Aug. 5th to Aug. 10th, 1879.
IV, from Aug. 5th to Aug. 14th, 1879.
V, from Aug. 9th to Aug. 11th, 1879.
VI, from Aug. 13th to Aug. 20th, 1879.
VII, from Aug. 13th to Aug. 18th, 1879.
VIII, from Aug. 15th to Aug. 17th, 1879.
IX, from Aug. 20th to Aug. 24th, 1879.
X, from Aug. 20th to Aug. 31st, 1879.
XI, from Aug. 21st to Aug. 31st, 1879.
XII, on August 21st, 1879.



INTERNATIONAL METEOROLOGY—OCEAN STORM-TRACKS.

Broken or dotted lines indicate that the lines so broken are doubtful.

Arrows, when charted, fly with the wind and exhibit wind-direction.

The tracks charted in black have appeared in previous *Reviews*.

The tracks charted in red have been made from data collected since preceding *Review*.

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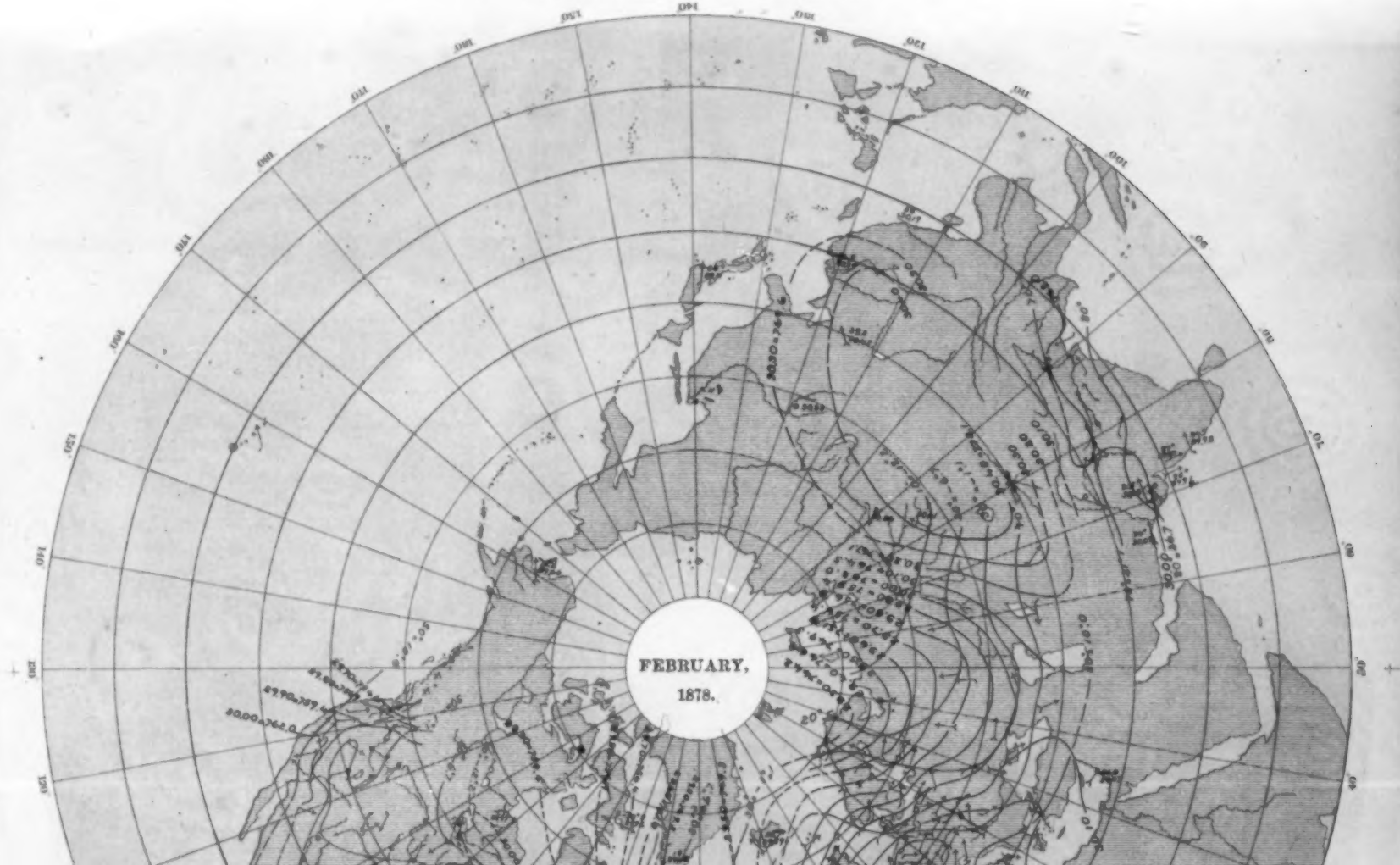
Albert J. Myer

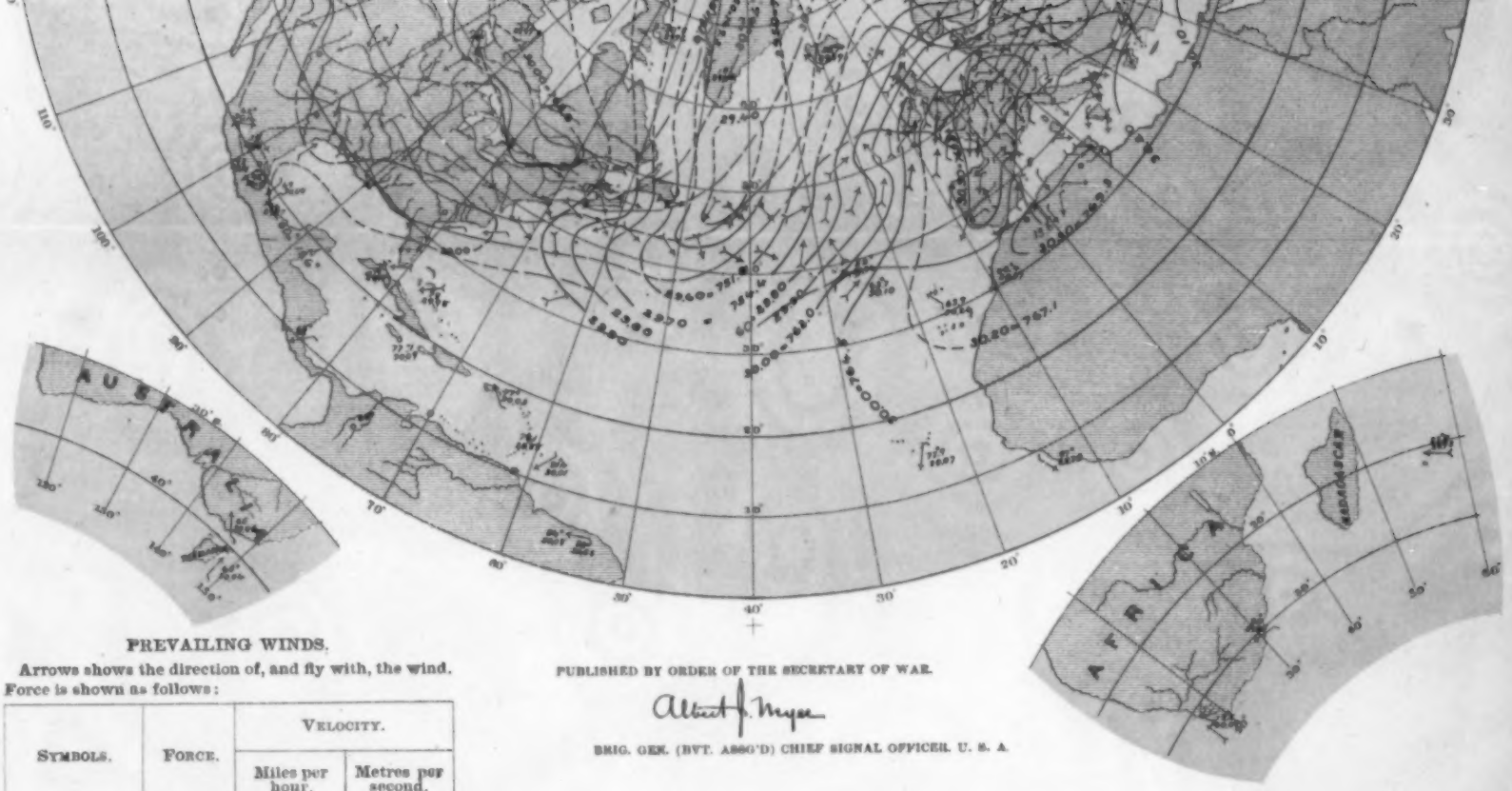
BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

INTERNATIONAL MONTHLY CHART.

Showing mean pressure, mean temperature, mean force and prevailing direction of winds at 7:35 A. M., Washington mean time, for the month of February, 1878, based on the daily charts of the International Bulletin.

No. V.





PREVAILING WINDS.

Arrows shows the direction of, and fly with, the wind. Force is shown as follows:

Symbols.	Force.	Velocity.	
		Miles per hour.	Metres per second.
→	1, 2	0 to 9	0 to 4.0
→	3, 4	9.1 to 22.5	4.1 to 10.1
→	5, 6	22.6 to 40.5	10.1 to 18.1
→	7, 8	40.6 to 67.5	18.1 to 30.2
→	9, 10	67.6 up	30.2 & over.

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Albert J. Myer

BRIG. GEN. (BVT. ASS'G'D) CHIEF SIGNAL OFFICER, U. S. A.

ISOBARS AND ISOTHERMS.

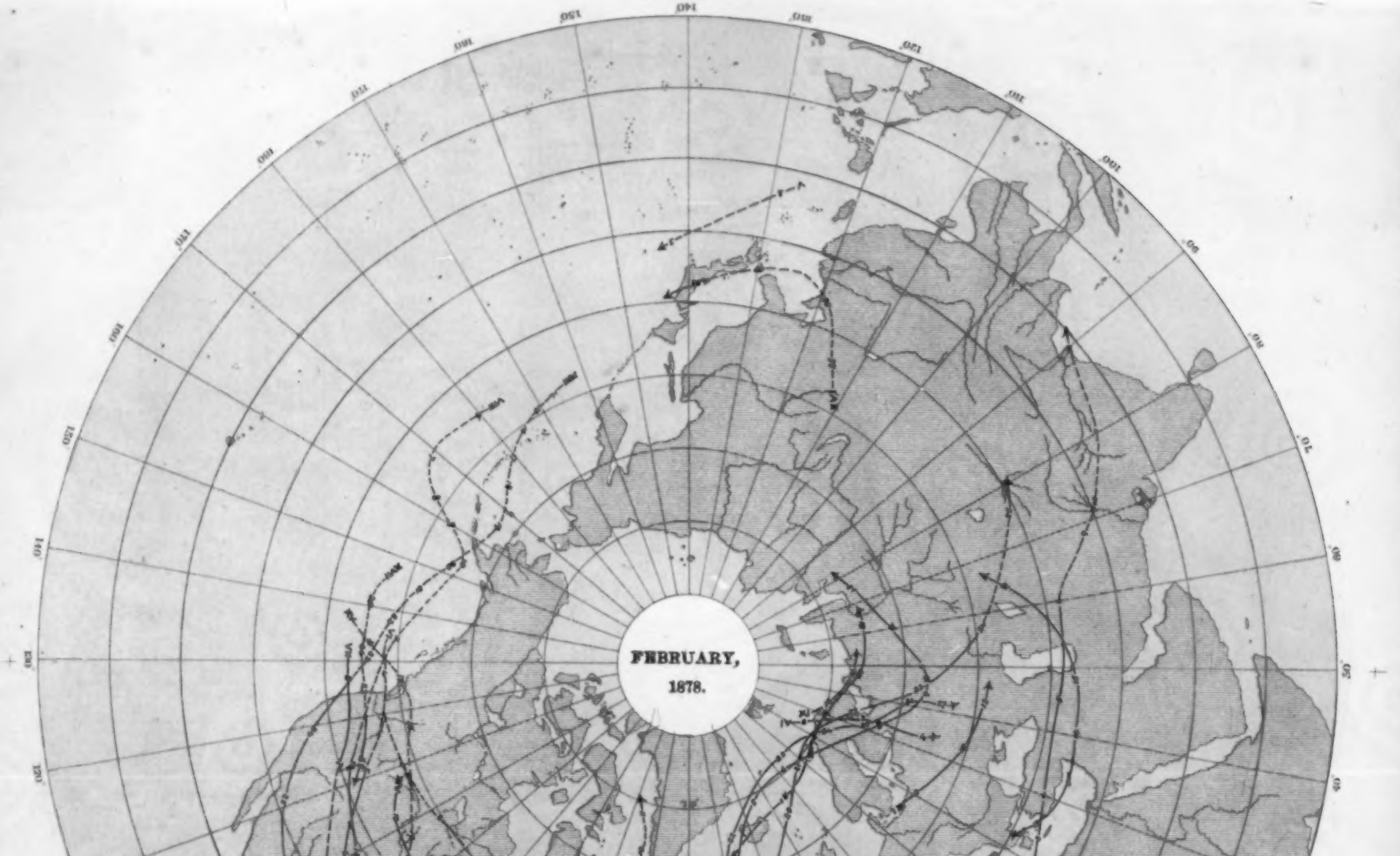
Isobars in *blue*; detached barometer means in English inches.

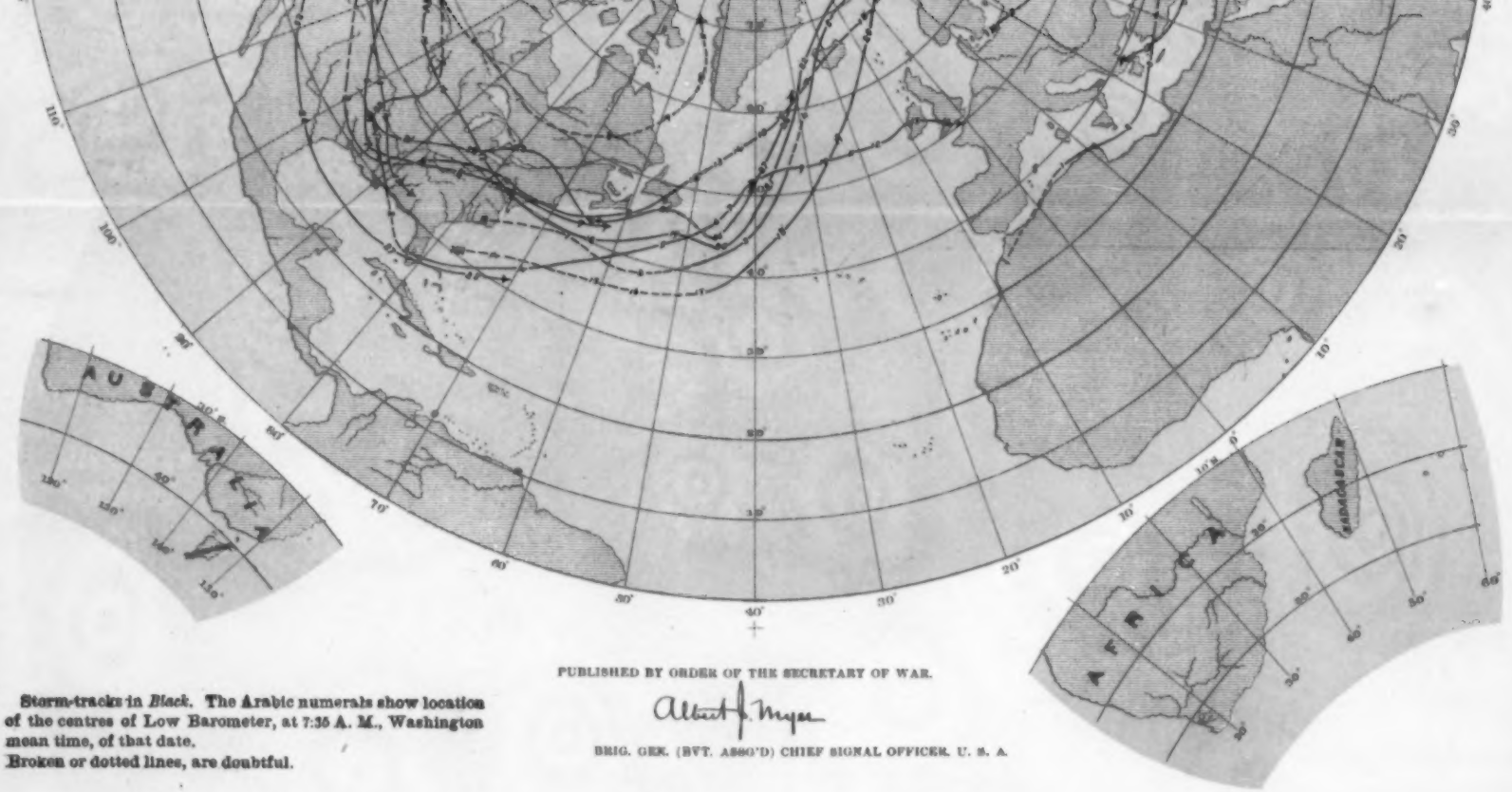
Isotherms in *red*; detached temperature means in degrees Fahrenheit.

INTERNATIONAL CHART.

Showing Tracks of Centres of Low Barometer for February, 1878.

No. VI.





Storm-tracks in *Black*. The Arabic numerals show location of the centres of Low Barometer, at 7:35 A. M., Washington mean time, of that date.
Broken or dotted lines, are doubtful.

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Albert J. Myer

BRIG. GEN. (BVT. ASSO'D) CHIEF SIGNAL OFFICER. U. S. A.